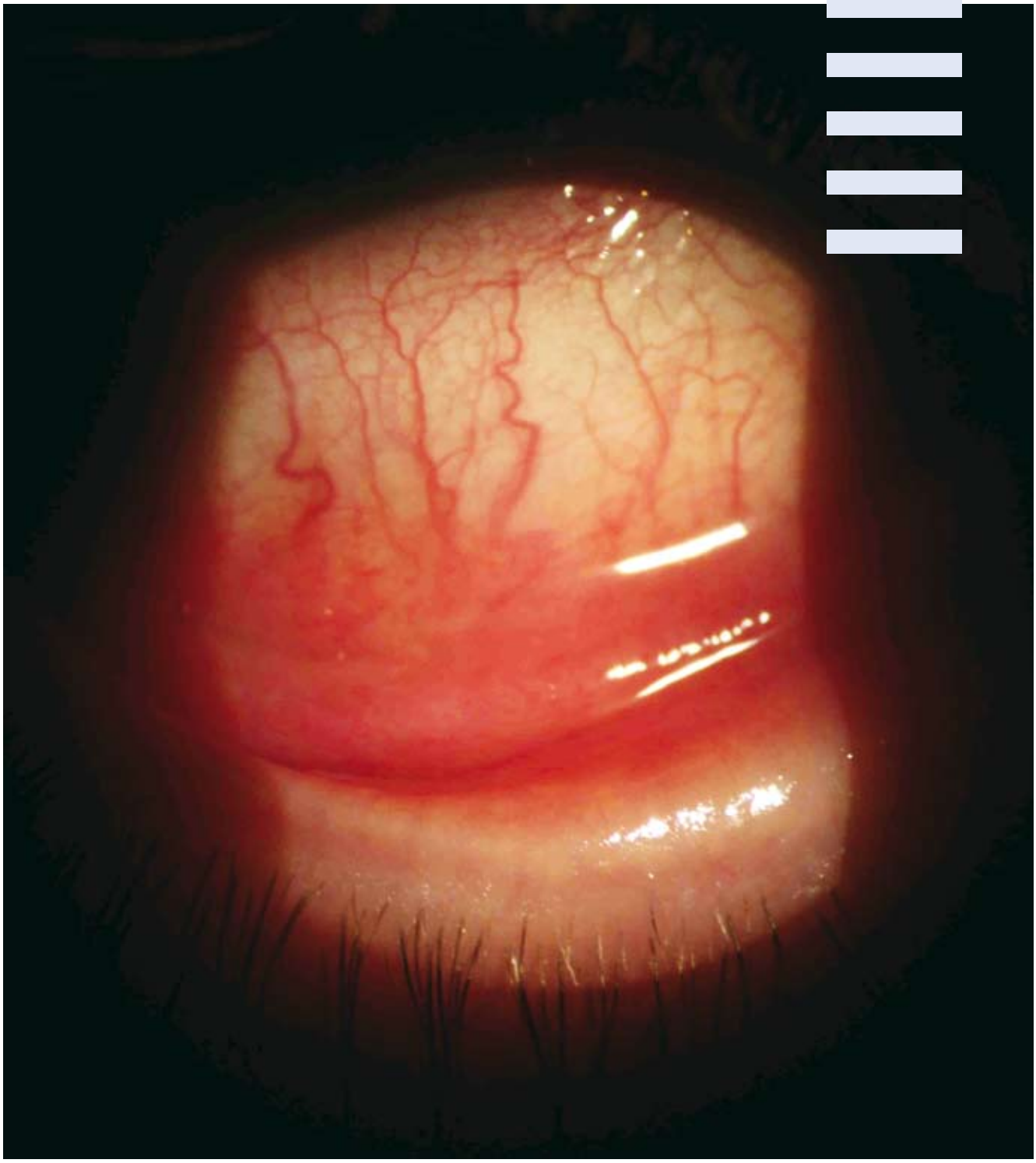
OPTOMETRY
pharma
SUPPLEMENT TO AUSTRALIAN OPTOMETRY SEPTEMBER 2009

Special issue
OCULAR ALLERGY



- Dry eye/allergy connection
- Eye-drops containing sulphur
- Allergic conjunctivitis
- Filamentary keratitis
- Rheumatoid arthritis
- Povidone-iodine

ZADITEN®
ketotifen eye drops, 0.025%

POWERFUL DEFENCE AGAINST ALLERGY EYES[1,2]

NOW SCHEDULED S2

- **Triple mechanism of action**[1,3]
  - Antihistamine[4*]
  - Mast cell stabiliser[5*]
  - Eosinophil inhibitor[6*]
- **Relieves ocular itching within minutes**[1,3]
- **Protects against symptoms for up to 12 hours**[1,7]
- **Suitable for children 3 years and older**[1,8]
- **Also available in preservative-free single dose units**[1]

Recommended Retail Price (rrp)	
Unit	**rrp**
2.5mL	$12.15
5mL	$19.75
Single Dose Units (0.4mLx20)	$19.95

* All studies were conducted in vitro

Always read the label. Use only as directed. If symptoms persist see your doctor/healthcare professional.

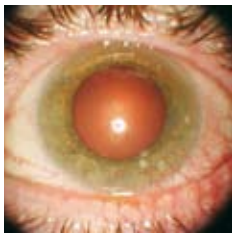
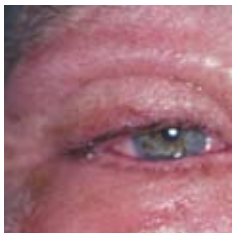
Please refer to the Product Information, available upon request, before recommending. Product Information is available from Novartis Pharmaceuticals Australia Pty Limited or visit www.novartis.com.au. Zaditen eye drops are indicated for symptomatic short-term treatment of seasonal allergic conjunctivitis in adults and children 3 years or older. Dosage: one drop of Zaditen into the conjunctival sac twice daily.

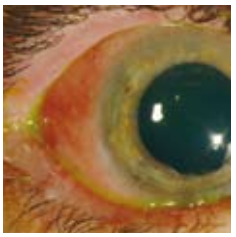
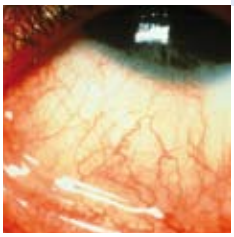
References: 1. Zaditen Product Information. **2.** Ganz M, Koll E, Gausche J et al. Adv Ther 2003; 20(2):79-91. **3.** Abelson MB, Ferzola NJ, McWhirter CL et al. Pediatr Allergy Immunol 2004:15:1-7. **4.** Sharif NA, Xu S, Yanni M. Drug Dev't Research 1994;33:448-453. **5.** Schoch C. J Ocul Pharmacol Ther 2003:19(1):75-81. **6.** Woerly G, Loiseau S, Loyens M et al. Allergy 2003:58:397-406. **7.** Greiner JV, Minno G. Clin Therap 2003:25(7):1988-2005. **8.** Abelson MB, Chapin MJ et al. Adv in Ther 2002:19(4):161-169.

Novartis Pharmaceuticals Australia Pty Limited. 54 Waterloo Road, North Ryde, NSW 2113, Australia. Phone (02) 9805 3555, Fax (02) 9805 0609, Medical Information and Communication 1800 671 203 NVO_Gen08_06/2009

NOVARTIS

Contents

Published by

OPTOMETRISTS
ASSOCIATION AUSTRALIA

Editor: **GARY OSHRY**
National Publications Manager: **SANDRA SHAW**
Clinical editor: **MARK ROTH**
Advertising: **GARY OSHRY**

Optometrists Association Australia
ABN 17 004 622 431
204 Drummond Street
Carlton VIC 3053
Tel (03) 9668 8500
Fax (03) 9663 7478
g.oshry@optometrists.asn.au
www.optometrists.asn.au

COVER
Forniceal oedema
Photograph: Julie Newport

Ocular allergy

Patients want to be free of their allergy symptoms but there is a lot more to allergy than just itching and more to its treatment than antihistamines

Art Epstein
OD FAAO
Phoenix, Arizona USA

Allergy is so commonplace that sometimes specialist clinicians like optometrists overlook what should be an obvious diagnosis. Part of the problem is that clinicians often think of allergy from the patient's perspective and as a result they oversimplify and minimise it. Despite the deceptive simplicity, there is a lot going on beyond the itch. In our waiting rooms, allergy is often buried under other presenting problems.

Why is allergy so important to optometry? It represents tremendous opportunity for practice growth, and becoming expert in recognising ocular allergy and treating it meets unmet medical needs.

Nearly 20 per cent of Australians are affected by allergy.[1] If that is not sufficient to get an optometrist interested in managing ocular allergy, global warming, demographic shifts and worsening pollution have broadly increased its prevalence.

Clinical aspects

When it comes to allergy there are some things that just about everyone knows. For example, all clinicians and just about every allergy sufferer has heard of histamine. Everyone knows that allergy causes itching and most know that antihistamines stop it. Most clinicians have heard of mast cells, the primary cells involved in allergy. However, the reality is that there is a lot more to allergy than just itching and more to its treatment than antihistamines.

What we recognise as clinical allergy today is a far cry from the intended purpose of the immune response that produces the allergic cascade. Even though an allergic patient reacts to otherwise normal and harmless things in the environment like cat dander or tree pollen, make no mistake: allergy is a serious inflammatory disorder. The origin of the allergic response is thought to be protection against invading and potentially life-threatening parasites. With modern times came better hygiene and allergy shifted into a life-disrupting rather than life-saving role.

Because the eye is directly exposed to the environment and largely unprotected, the ocular allergic response can be especially profound. While other cells such as basophils and eosinophils play a role in chronic allergy, mast cells are the primary actors in acute ocular allergy.

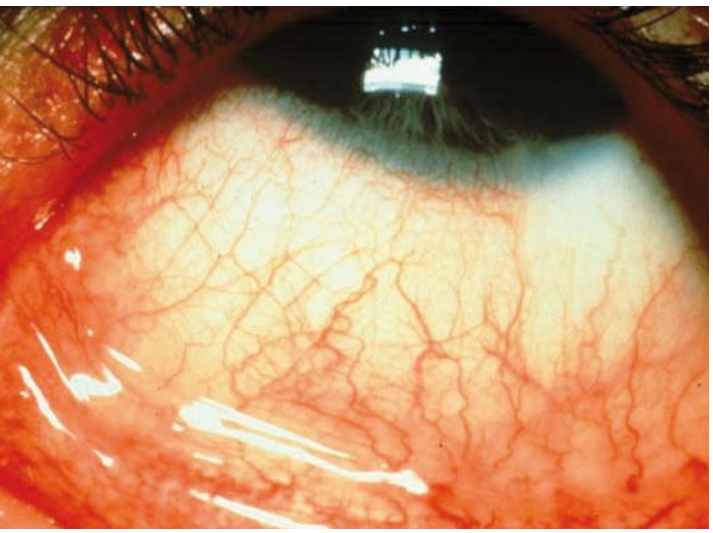
There are about 50,000 mast cells present in conjunctival tissues. Once sensitised by prior exposure, mast cells act as battle stations of allergic response that initiate on re-exposure. During quiet times mast cells reside deep within the conjunctival tissue; during active allergy, they migrate more superficially to be better positioned to fend off invading allergens. Mast cells harbour all of the elements of allergic response including histamine and the many other active chemicals that mediate the full-blown allergic response.

It is important to realise that clinical allergy involves more than just histamine. On activation, the mast cell releases histamine as well as other preformed and stored vasoactive and lytic substances such as tryptase and chymase. At the same time, synthesis of a variety of proinflammatory and messenger molecules such as cytokines and leukotrienes is initiated. The ocular allergic cascade is primarily an immediate immune response, termed an early phase response, while in the rest of the body a secondary, late phase reaction marked by cellular mobilisation and infiltration typically follows.

Differential diagnosis

The most common forms of ocular allergy encountered in optometric practice are seasonal and perennial allergies. In the USA—and probably in Australia as well—those two entities represent approximately 95 per cent of all clinical allergies seen. Seasonal allergic conjunctivitis (SAC) (Figure left) manifests as an acute response to seasonal elevations in environmental allergen levels; tree pollens are a good example. Perennial allergic conjunctivitis (PAC) typically persists

Seasonal allergic conjunctivitis



Drug	Trade name	1st publication	1st use
Cromolyn	Intal	1967	asthma
Nedocromil	Tilade	1977	asthma
Ketotifen	Zaditen	1977	asthma/rhinitis
Azelastine	Astelin	1979	rhinitis
Levocabastine	Livostin	1985	rhinitis
Epinastine	Alesion	1987	rhinitis
Olopatadine	Patanol	1995	allergic conjunctivitis

Mast cell stabilising effectiveness (at marketed concentrations) of currently available 'combination' products for allergic conjunctivitis

year-round and is triggered mostly by indoor allergens such as the droppings of the ubiquitous dust mine. PAC tends to be milder but may be exacerbated by concomitant seasonal allergies.

The hallmark symptom of allergy is itch; the itch of ocular allergy can be maddening. Eye rubbing can be uncontrollable and only further worsens the situation by mechanically degranulating conjunctival mast cells further. Redness, swelling and tearing are common as the eye seeks to rid itself of the inciting allergen. With increased chronicity typical of perennial allergy, a serous discharge may be present. The tarsal conjunctiva will often have a papillary reaction, which is easily viewed during slitlamp examination. In the vast majority of cases, a family history of allergy will be present.

While presence of itching in a red teary eye generally makes the diagnosis of ocular allergy straightforward, several confounding factors may serve to confuse. Allergy can exist concomitantly with other disease states such as dry eye. A deficient tear layer can potentiate allergy due to the relatively higher concentration of allergens. Airborne pollution can serve as an inflammatory stimulus and can worsen the allergic response, exaggerating the other signs and symptoms relative to itching.

Viral conjunctivitis typically presents acutely, often after upper respiratory infection and is often accompanied by swollen pre-auricular lymph nodes and a follicular tarsal reaction. Bacterial conjunctivitis is notable for mucoid discharge of varying degrees as well as an acute presentation. A papillary response may also be present with bacterial conjunctivitis.

Allergy management

Antihistamines have long been a mainstay of allergy therapy. They function by preferentially occupying histamine receptors and blocking subsequent attachment of histamine. This prevents the activation and subsequent physiologic response. Ocular antihistamines are available over the counter (OTC) and in some countries as prescription products.

In addition to antihistamines, mast cell stabilisers such as Cromolyn Sodium were once commonly prescribed but their effectiveness has been brought into question. All of the topical mast cell stabilisers used for ocular therapy were created originally for systemic allergic disease.

Topical NSAIDs like Voltaren and Acular can reduce itching but their effects are so indirect and limited compared to current topical-antiallergy drops that they have fallen into disuse.

If there are minimal associated signs of inflammation such as chemosis or marked conjunctival hyperemia, a topical antihistamine/mast cell stabiliser is the drug of choice for allergy therapy.

However, there are significant differences between Rx Patanol and OTC Zaditen relative to effective mast cell stabilisation at their marketed concentrations.

Mast cells differ depending on where they reside in the body. For example, conjunctival mast cells are physically and histochemically different from mast cells in the nasal mucosa or respiratory system. Likewise, medications that stabilise mast cells are typically effective only for the specific subset of mast cells they are designed to treat. In other words, mast cell stabiliser drugs designed for rhinitis or asthma are ineffective in treating seasonal allergic conjunctivitis. This appears to be of clinical significance.

Functionally, the only currently available ophthalmic medication that effectively combines antihistaminic activity and effective human conjunctival mast cell stabilisation is olopatadine (Patanol, Alcon Laboratories) (Table above).[2] Introduced in 1997, Patanol was developed specifically for treatment of allergic conjunctivitis. All other currently available ophthalmic medications were first introduced for rhinitis, asthma or other systemic allergy.

Steroids are broad spectrum anti-inflammatory agents

With modern allergy combination agents showing excellent effectiveness for most SAC patients, steroids should be reserved primarily for short-term use for patients who are non-responsive to other medications or for patients who require aggressive treatment during an acute flare-up while initiating long-term therapy with allergy specific medications. Any patient on topical steroids for more than one week must have regular frequent intraocular pressure checks and anterior segment examination.

Keys to success

Treating allergy is really all about meeting patient needs. What patients want is effective relief of all of their allergy signs and symptoms. They want to be rid of the maddening itching, the red and swollen eyelids, the chemosis and the tearing that leaves tracks down their cheeks. They want an easy to use medication that addresses all of their symptoms and is safe and side-effect free.

Prescribing a medication that works effectively the first time highlights your clinical acumen. Prescribing is the key word. Allergy can help bond patients to you and your practice but only if you prescribe a medication that brings about quick and lasting relief. Allergy makes patients miserable. You have the power to make them feel better.

OTC products are attractive to patients but they tend to be less effective—especially products containing vasoconstrictors, which lead to overuse due to rebound redness. Likewise, even more advanced OTC products like Zaditen tend to break the therapeutic cycle because the optometrist is removed from the therapeutic loop. My preference is to rely on Rx products that in my experience have consistently proven their effectiveness.

References

1. Australasian Society of Clinical Immunology and Allergy
2. Leonardi AA, Abelson MB. Double-masked, randomized, placebo-controlled clinical study of the mast cell stabilizing effect of treatment with olopatadine in the conjunctival allergen challenge model in humans. *Clin Ther* 2003; 25: 2539-2552.

The dry eye and ocular

Julie Newport
BAppSc(Optom)
GradCertOcTherap

Ocular dryness and allergy coexist frequently. In some cases this may be because an eye with insufficient lubrication fails to efficiently flush environmental allergens, allowing them to concentrate to the point where allergic reactions are triggered. Conversely, the immune cascade associated with the allergic response may well trigger ocular dryness in some patients. Chickens and eggs aside, both conditions coexist often.

The number of ocular dryness cases appears to have increased in recent years, which may be in part due to frequent and prolonged use of computer screens. Our failure to blink while staring at a screen as often as we would do so otherwise has the potential to interrupt at least four effects of blinking that are essential in maintaining the integrity of the tear film:

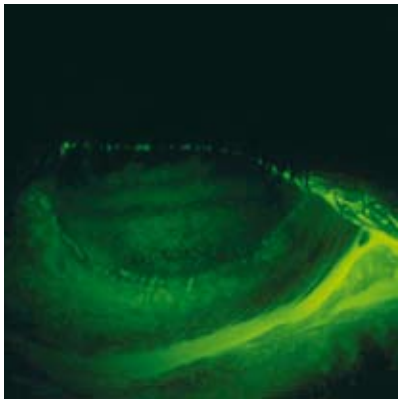
- the pumping of tears from the lacrimal gland
- the pumping of oils from the meibomian glands
- the movement of the tears, and the foreign material they carry, towards the puncta for removal
- the resurfacing of dry patches as evaporation occurs.

I have never been a fan of ocular lubricants. Unless highly motivated, patients will not use them as often as they should, and in many cases the effect is extremely short-lived and does not address the underlying cause of the condition. From my experience, the vast majority of dry eye patients have evaporative concerns.

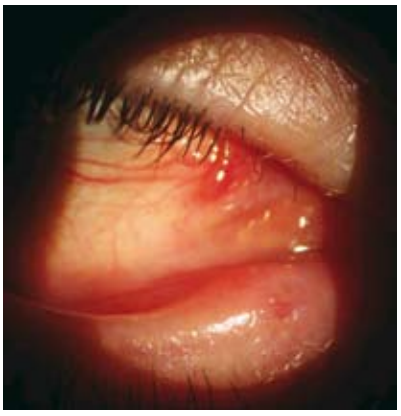
Meibomian glands are our built-in anti-evaporative system. Ideally, when we blink, liquid meibomian oils spill into our tears, migrate to the surface and provide an anti-evaporative shield. Most people, even those without obvious dry eye concerns, appear to have some degree of dysfunction of the meibomian glands. This may be due to the action of normal skin bacteria flourishing in the wonderfully warm, moist and hidden-away environment that is the meibomian gland: a bacterium's paradise.

It is often particularly evident in patients with rosacea and may be due to slightly increased temperatures around the dilated blood vessels in a rosacea patient's facial vessels, including those of their lid margins. Whatever the reason, most people appear to have some degree of meibomian gland dysfunction (MGD); some have reached the threshold of experiencing symptoms and some have not.

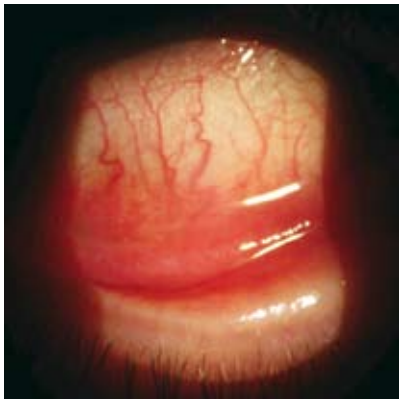
BH. Day 1: corneal staining



BH. Day 1: swollen plica



BH. Day 1: forniceal oedema



Does the dry eye cause the allergy, or does the allergic reaction cause the dry eye? Either way, there are strategies to manage the condition.

allergy connection

I stumbled across the immediate and prolonged benefits of heat therapy many years ago when a rosacea patient asked me to remove a stye. On heating it and giving it a satisfying squeeze, I noticed that all the neighbouring meibomian glands had thick, opaque plugs of dysfunctional oils that had no chance of providing any sort of anti-evaporative effect on the ocular surface. I kept going around the lid, emptying them all, after which the patient proclaimed that the eye in question was now much more comfortable than the other, which then responded similarly. We worked out a system whereby he could do this at home and his eye comfort improved markedly.

Since then, hot pack therapy (HPT) has gradually become the flagstone treatment for dry eye at my practice. It does not work for everyone but for most patients the benefits are enormous, immediate and prolonged, and the treatment addresses the underlying reason for the eyes being dry. If, concurrently, there are other reasons for the eyes being dry, reversing the MGD that most people seem to have appears to tip the balance back towards ocular comfort.

HPT takes several minutes a day to perform. I ask patients to do it daily for two weeks, then revisit the practice so I can examine the result. The aim is to maintain the effects of the initial two weeks' work without having to spend as much time doing so.

Case report

BH, a 48-year-old male forklift driver, has worked in a fruit and vegetable distribution facility for many years. In recent years, he had noticed that entry into refrigerated areas triggered significant ocular irritation, including burning, significant itching, extreme photophobia and dryness. While sitting in my consulting chair he could barely keep his eyes open. His vision was extremely variable ('filmy'), which was hampering his pursuit of astronomy, a hobby he greatly enjoyed.

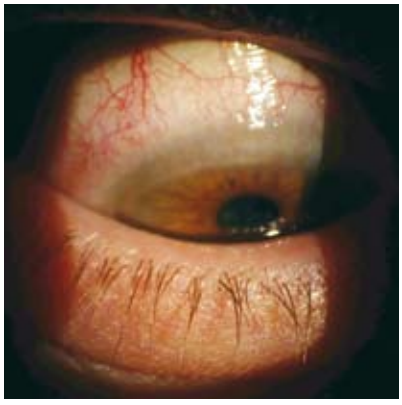
Interestingly, the onset of his symptoms appeared to coincide with the onset of ocular pain while showering. Similar complaints have been expressed by other patients, notably after the shower had been cleaned recently with harsh chemicals such as bleach. I wondered whether BH's initial symptoms may have been triggered by gaseous residual cleaning chemicals being liberated by hot water and steam, and whether goblet cell damage may have been involved. Perhaps the act of extreme irritation of the ocular surface triggers a cycle whereby reflex tears (loaded with pro-inflammatory cytokines) and the consequent immune response, which includes irritation, are a self-perpetuating snowball of ocular discomfort.

BH's ocular surface was a disaster. I was amazed he could open his eyes at all. The corneal surface was not just stained, it looked like someone had taken to it with a sandblaster; ditto for the bulbar conjunctiva. His plicae and lower fornices were extremely swollen, as were his limbuses, and pannus formation had occurred in various places around both limbuses. The lid margins were swollen and red, as were the lower palpebral surfaces. Meibomian gland dysfunction was present, as it is in most symptomatic and asymptomatic patients. Tear break-up time was two seconds in each eye. Intraocular pressures were R & L 19 mmHg.

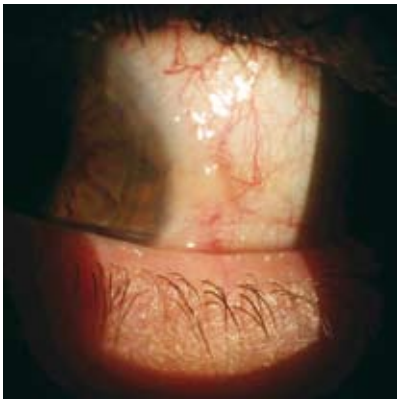
BH's topographic plots depicted cone formation, or at least 'form fruste' keratoconus.

Continued page 6

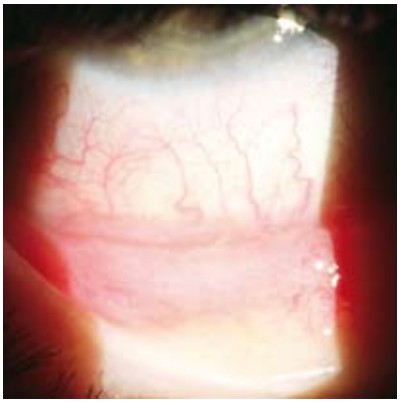
BH. Day 1: red pannus



BH. Day 1: limbal oedema



BH. Day 14: swollen fornix



The dry eye and ocular allergy connection

From page 5

With spectacles his vision was R 6/7.5 L 6/6, although it took several blinks to achieve this.

He had a history of asthma and eczema, which raises the stakes for cone development. I elected not to perform refraction at BH's first visit because he could barely keep his eyes open and it was clear the refraction would be hampered by the variability invoked by blinking.

He had tried various approaches over the years, including once-daily FML drops, lubricating drops, anti-histamine drops and Lid Care. Nothing had helped significantly.

I started him on hot pack therapy to improve his meibomian secretions.

To supplement this, I started him on a mixed ointment approach as well. This involved Hycor (now only available in 1%) and Chlorsig ointments applied concurrently to the lid margins and cul-de-sacs. Ointments are terrific if you are after prolonged contact time but they are awful if you want your patients to see anything. Our compromise was to start with bd dosing, once at 3 pm when BH arrived home from work, and once at 9 pm just before bed. The early-morning hot pack therapy helps to clear the ointment from the ocular surface so it dovetails very nicely for patients who drive to work. It was clear that his process was not primarily infective, but I added the Chlorsig prophylactically because of the severe nature of the corneal and conjunctival staining and to decrease the bacterial load prior to steroid treatment.

First review

At his first review two weeks later, BH could demonstrably keep his eyes open and I was cautiously happy with his progress. The consistency of his vision had improved to the point where he was now recognising faces in shopping centres. There was still much improvement yet to be had but most of the symptoms had settled significantly—he had even forgotten to wear his sunglasses one day. His ocular surface could no longer be described as 'sandblasted' and the swelling around the limbuses had gone. Although improvements were made to the overall presentation, there remained significant redness and swelling in the lower palpebral surfaces, plicae and fornices. His itching had improved but was still there to a certain extent, particularly along the upper lid margin and in the plicae.

The end result of his allergy/dry eye condition was inflammatory ocular surface disease, which required a topical steroid to help short circuit the inflammation and allow my other management to work better.

His intraocular pressures were measured at R 9 L 15 mmHg and I asked him to add tid Flarex to his daily routine, while keeping the hot packs and steroid/antibiotic ointment mixture going bd. I asked him to modify his application of the steroid ointment to be partially specific to the upper lid margin. I also blocked both lower puncta with five-day gel plugs (available from Designs For Vision) to allow better retention of his basal tears, theoretically hampering any excessive triggers to reflex tearing, and also allow better retention of the Flarex drops. My preference was to block only the lower puncta to maintain some flushing of his tears, which is an important feature of maintaining a healthy tear layer.

I have stressed again to BH that this is going to be a long process. After only two weeks he has come a long way but there is still a lot of room for improvement. If goblet cells are indeed involved, it could take many months until there are signs of significant objective improvement of the ocular surface and he may have to rely on several strategies at once to keep it going in the right direction.

My intentions for the mid-term are to taper the steroids as soon as there is significant

Refraction

Where a refractive correction is clearly needed for dry eye patients, I find it prudent in many cases to take a refractive reading with a grain of salt. For many of these patients, the refraction tends to be a moving target, necessitating a remake of their new spectacles if the refraction is taken as gospel while the ocular surface is unstable. This could be due to unstable topography, variations in the tear viscosity altering their perceptions of lens comparisons during refraction, or a combination of the two.

Patanol

Patanol (Olopatadine hydrochloride) is a highly-effective anti-allergy product. The molecule has a dual effect; as an antihistamine it acts as a 'squatter' for the histamine molecule, thereby blocking the allergic cascade. As a mast cell stabiliser it stops circulating white blood cells from degranulating (exploding) and thereby blocks the release of histamine. This is all well known by Australian optometrists who are prescribing it; for those who have not yet completed therapeutics courses and therefore are not yet writing prescriptions for Patanol, a similar effect is gained through the use of Zaditen drops, which now no longer require a prescription.

Tears Again

Tears Again (available through BioRevive) is immensely useful for occasional dry episodes. It is quick, easy to apply and entirely appropriate when the eyes have an evaporative problem. Because it is pressurised, there is no need to dispose of any remaining solution before the printed use-by date, and it can be used as frequently or as casually as is required by the patient's symptoms. Tears Again is irritating for some patients, which appears to correlate with the degree of dryness they experience. If the eyes are extremely dry, Tears Again causes irritation and when mildly to moderately dry, it is the icing on the cake.

Blurred vision

Blurred vision is frequently interpreted by patients as a need to wear spectacles or have their spectacles strengthened. In the majority of cases where a low refraction is present, intermittent and even constant blur can be addressed satisfactorily by improving the quality of the tear film. This could be due to any of a number of factors, including:

- homogenisation of the tear film: variable viscosity seen in dry eyes can lead to intermittent blur
- reduction of triggers for reflex tearing: hypotonic tears can create an osmotic gradient, leading to at least intermittent or transient changes in corneal thickness, topography and transparency
- more consistent removal of debris from the ocular surface.

Heat pack therapy

Heat pack therapy involves four steps and takes about five minutes to perform.

1. Warm a blue gel hot pack until it is uncomfortably warm but not scalding. Wrap it in a clean paper towel to diffuse the heat, test it against the inside of the arm for comfort, then hold it firmly against the closed lids for two minutes.
2. Remove the hot pack, look up to the ceiling and with the very tips of the index fingers, press against the lid margins, just outside the roots of the lashes. Spend about three seconds at each finger-width point, and press firmly enough to cause diplopia. Both eyes can be treated simultaneously. Repeat this for the upper lids, maintaining an upward gaze (and closed eyelids) for enhanced patient comfort.
3. Dissolve dysfunctional oils that have now landed in the tear film (making vision very poor in some cases) by instilling Blink-N-Clean drops. The modified surfactant is perfect for clearing the filminess immediately.
4. Clean lid residue with Lid Care. Lid Care also removes normal lid debris, such as dead flakes of skin, which may provide a food source for bacteria, and as such is usually what we should aim for as the cornerstone of maintenance therapy.

reduction in the redness and swelling of the fornices, palpebral surfaces and plicae, replace them with Patanol to keep the itching under control, and probably to revisit the punctal plugging several times. He may well be a candidate for semi-permanent or permanent punctal occlusion. I'll probably recommend that he add Tears Again on an as-needed (PRN) basis to improve the anti-evaporative properties of the tear film. I am hoping to gradually discontinue many of his strategies as his signs and symptoms return to normal.

It is very difficult to resolve ocular surface inflammation without a short course of steroids where the risk of side-effects is minimal, but for obvious reasons they are not recommended for long-term use. Steroids are fantastic to get things started and patients love the effect of ocular comfort, but once the condition is brought under control other treatment strategies can be used.

Eye-drops can cause anaphylaxis

Eye-drops containing benzalkonium chloride preservatives (BAC) can cause anaphylaxis, according to a report published in *Clinical and Experimental Optometry*.

Recognising the early signs of anaphylaxis is important due to the possibilities of rapid progression to a fatal outcome secondary to airway occlusion and vascular collapse.

The report illustrates a case of a 31-year-old Caucasian female who presented to an emergency department with difficulty breathing, eye redness and pain following ophthalmologic administration containing BAC.

The symptoms began after using epinastine ophthalmic allergy prescription drops given as samples and used bilaterally for dryness with contact lenses and empiric treatment of allergic conjunctivitis.

A similar episode had occurred in 2002 when the patient experienced swelling and difficulty breathing about 75 minutes after receiving the BAC-containing eye dilator drops. The cream used for treatment also contained BAC and exacerbated the condition.

The report advises health-care providers to be prepared with basic medical supplies in the event that a patient experiences anaphylaxis during testing and administration of suspected allergens.

The most effective approach to both prevention and treatment is patient counselling and avoidance of medications containing BAC, and instructing the patient to report immediately similar reactions to other agents. In this case the patient was switched to a peroxide-based eye-drop solution.

Anderson D, Faltay B, Haller N. Anaphylaxis with the use of eye-drops containing benzalkonium chloride preservative. *Clin Exp Optom* 2009; 92: 5: 444-446.

Allergic response to eye-drops containing

Dr Raj Pathmaraj
FRANZCO FRCS MBBS
Vision Eye Institute VIC

The sulphur found in some antibiotic and anti-glaucoma drops can cause an allergic reaction. Bleph 10 liquifilm containing Sulphacetamide is an antibiotic used in the treatment of gram-positive bacterial infections of the eye and adnexa. Although these drops are infrequently prescribed by optometrists or ophthalmologists, they are widely used by patients and are available over the counter without prescription.

Soframycin (framycetin sulfate) and Genoptic (gentamicin sulfate) are S4 topical antibiotics that contain sulphur, which may cause sensitivity reactions in some patients.

One of the main concerns with medications that contain sulphur is the potential systemic side-effects, which can be life-threatening. With eye-drops there is minimal systemic absorption so side-effects occur rarely. Systemic absorption of these drops can be further minimised by digital naso-lacrimal punctal occlusion for one minute after administering but practitioners should always be alert to signs of systemic reactions.

For example, although rare, Stevens-Johnson's Syndrome, electrolytes imbalance (as a complication of oral Diamox) resulting in cardiac arrest, and bone marrow depression leading to aplastic anaemia can occur.

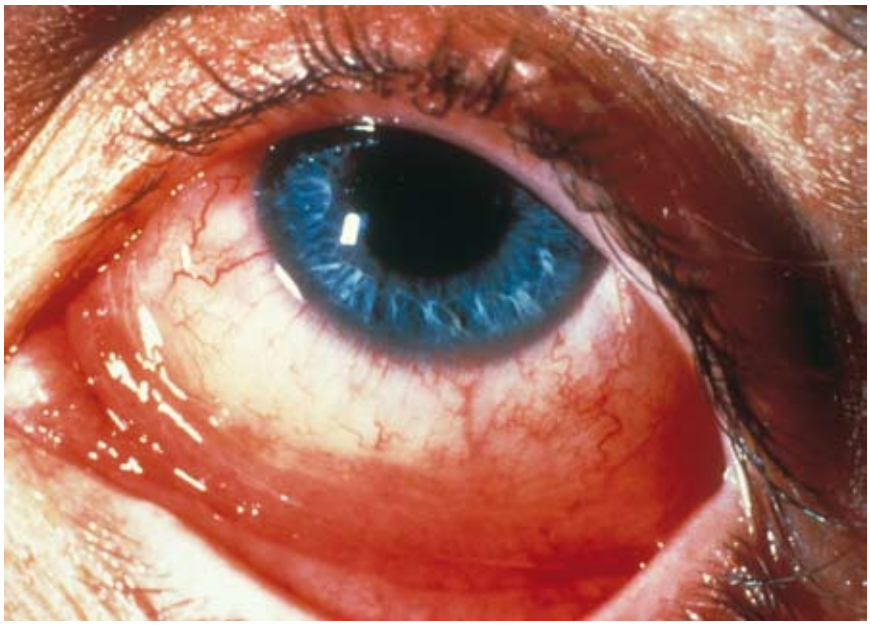


Figure 1. Allergic conjunctivitis

Types of allergic reactions

Allergic contact reaction

This represents a type-IV (delayed) hypersensitivity reaction and can happen from four to 40 weeks after commencing. Incidence of this reaction occurring is about one to five per cent of cases and is more common with dorzolamide (Trusopt) than brinzolamide (Azopt), drops used for the treatment of ocular hypertension and glaucoma.

Clinical features include papillary conjunctivitis (Figure 1), chemosis, eczema of the eye-lid–worse on the nasal aspect of the lower eye-lid–and itching. In severe cases the entire lid can become swollen and secondarily infected (Figure 2), resulting in infectious eczematous dermatitis. Chronic dermatitis of the lower lid skin can lead to cicatricle ectropion.

Ask the patient of any previous known drug allergies and warn the patient of side-effects when commencing the eye-drops. If allergic reactions develop, advise the patient to stop using the medication and return to the practice for further advice.

When you examine the patient to establish whether an allergic reaction is present, it is best to document your findings in the patient history to ensure these drops are not prescribed to the patient in future, then inform the patient's general practitioner as this history may be significant for other medications prescribed.

A cold compression will help decrease itching and swelling and if secondary infection is suspected, oral antibiotics may be warranted. A steroid eye ointment such as Hycor 1% can be applied for a few weeks to the lower lid skin to treat the dermatitis. In rare cases, surgical correction of ectropion may be required.

Anaphylactoid reaction

This represents a type-I immediate hypersensitivity reaction. This is called anaphylactoid reaction because it is not associated

sulphur

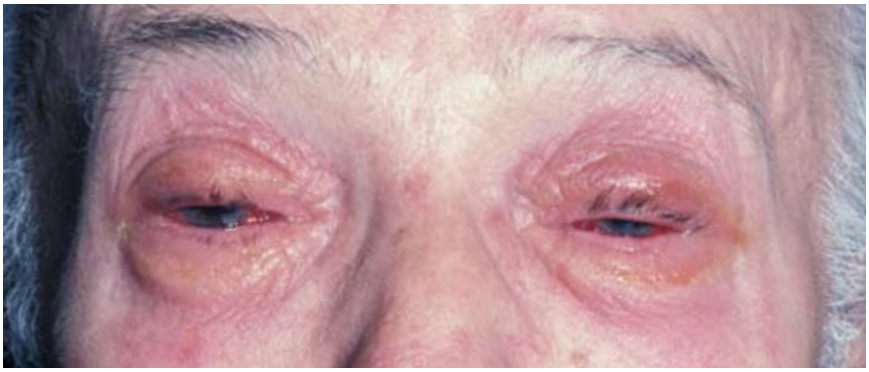


Figure 2. Allergic blepharoconjunctivitis

with systemic anaphylaxis (anaphylactic shock).

Symptoms present within minutes of exposure to the drops and include acute itching, conjunctival hyperaemia and chemosis, and oedema of the upper and lower lid (Figure 3). The upper lid can often present worse than the lower lid. Systemic symptoms of anaphylaxis have also been reported including mild erythema multiforme or a severe version of Stevens-Johnson's Syndrome, but these are rare occurrences.

Preventative measures for anaphylactoid reaction are the same as those mentioned for allergic contact reaction. Other measures include cease using use of the drops and apply cold compressions, topical vaso-constrictors and steroids. Oral antihistamines can also be helpful in alleviating itching. As with any other systemic symptoms of anaphylaxis, immediate medical attention is required.

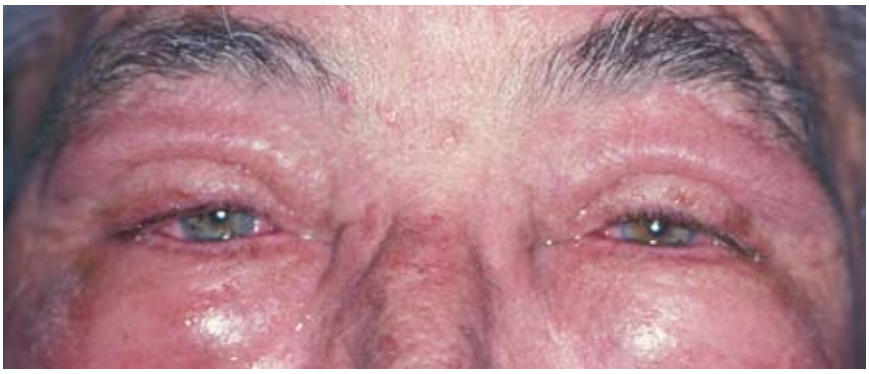


Figure 3. Allergic reaction to chloramphenicol

- **Cicatrising allergic conjunctivitis reaction (pseudo pemphigoid)**

This is a type-III (antigen-antibody) hypersensitivity reaction resulting in cicatrising conjunctivitis leading to scarring in bulbar, fornicial and palpebral conjunctiva, which is worse inferiorly (Figure 4). This also leads to conjunctival keratinisation and nasolacrimal punctual occlusion. It takes many months to develop this reaction. If it persists the patient should be advised to cease using the offending drops. This reaction has been reported with use of dorzolamide.

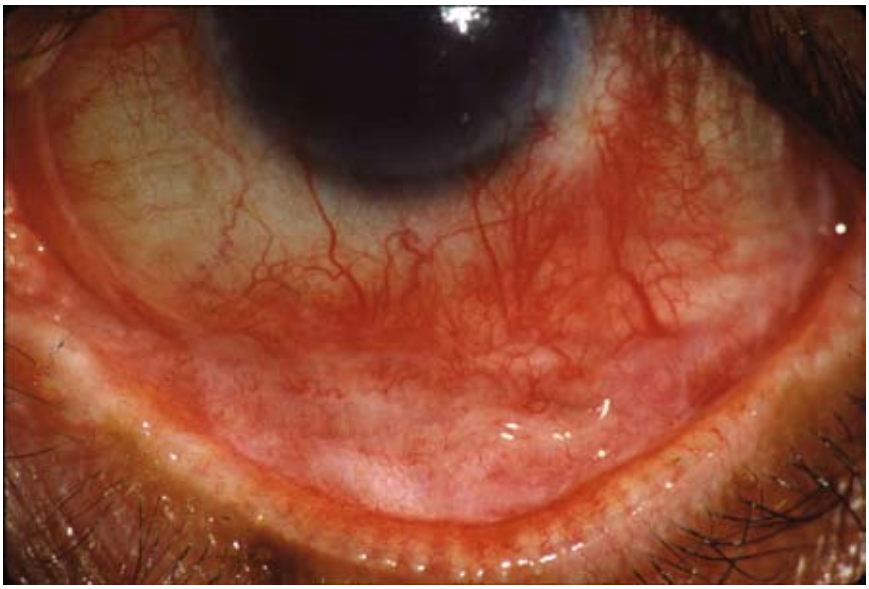


Figure 4. Cicatricial pemphigoid

Differential diagnosis

- The allergic reaction could be secondary to other components in the drops such as Timolol in Cosopt or preservatives (benzalkonium chloride) in the drops.
- The patient could have a toxic reaction to the drops without an underlying immune reaction, characterised by absence of itchiness and chemosis. Cornea are often involved with diffuse pinpoint keratitis involving the entire cornea.
- The reaction may be an exacerbation of pre-existing meibomian gland dysfunction and dry eye.

References

1. Munshi V, Ahluwalia H. Erythema multiforme after use of topical dorzolamide. *J Ocular Pharmacol Therap* 2008; 24: 91-93.
2. Tabbara KF, ed. Recent trends in ocular allergy. *Int Ophthalmol Clinics* 2003; 43: 73-81.
3. Abelson MB. Allergic Diseases of the Eye. Philadelphia: WB Saunders, 2000. pp 180-182.

Allergic conjunctivitis

Prompt treatment may

Ben Connell
BMBS FRANZCO MPH
Eye Surgery Associates

Vernal (VKC) and atopic kerato-conjunctivitis (AKC) represent two conditions at the severe end of the allergic eye disease spectrum, both important because of their ability to cause significant visual morbidity.

In most cases of both VKC and AKC, the diagnosis is relatively clear with a history of itching, worse in Spring and certain exposures, accompanying other systemic allergic conditions (asthma and allergic rhinitis) and typical clinical findings. VKC onset is typically before the age of 10 years and most cases resolve by adulthood; AKC is a condition of adulthood.

Many of the principles of management are common to both conditions. Patient education is very important. The clinician should encourage the patient to become aware of what precipitates their condition and encourage avoidance, where possible. Patients should be encouraged to avoid rubbing their itching eyes and to use preservative-free lubricants as frequently as required.

Figure 1. Schematic diagram indicating for supra tarsal steroid injection

The mainstays of prophylactic therapy are combined topical H1 receptor antagonist and mast cell stabiliser: either Patanol (olopatadine HCL 0.1%) or Zaditen (ketotifen 0.025%). Both are used twice daily. Lomide (lodoxamide 0.1%) and Opticrom (cromolyn sodium 2%) can also be used as prophylactic therapy but they exert only a mast cell stabiliser effect, without histamine receptor antagonism. The latter two provide no immediate relief and require more frequent dosing.

For less severe acute exacerbations, Zaditen single use ampoules can be used. They do not require a script and provide an alternative to opening a standard-size bottle for an attack that is likely to resolve over two to three days.

Topical steroids are used for more severe acute exacerbations. The frequency and duration of therapy should be large enough to provide a clinical response, but minimised to reduce the risk of raised intraocular pressure and cataract development. Flarex (Fluoromethalone acetate 0.1%) and FML (fluoromethalone 0.1%) should be used in preference to Maxidex (dexamethasone 0.1%) and Prednefrin Forte (prednisolone acetate 1%) based preparations for their reduced ocular penetration.

Flarex drops, used four times per day and tapered to stop over two to three weeks, are usually adequate to treat most exacerbations. For severe episodes, the Flarex may need to be used two-hourly for the first two to three days. Steroid use should be minimised, particularly in the case of VKC where natural history is relatively good: most cases resolve by early adulthood. For acute exacerbations, Patanol or Zaditen should be commenced in addition to the topical steroid and continued for at least one to two months.

Supratarsal steroid (triamcinolone) injection is indicated in VKC where there is a shield ulcer non-responsive to topical steroid. In a patient with shield ulcer, topical steroids should be initiated two to four hourly for at least one to two weeks before proceeding to supra tarsal steroid injection. Supra tarsal steroid injection is given via transcutaneous injection (Figure 1), usually under general anaesthetic as most patients are young.

The main issue with this long-acting steroid is the risk of prolonged ocular hypertension because, unlike steroid drops, the medication cannot be withdrawn promptly. At the time of steroid injection, the ulcer bed is usually debrided and superficial keratectomy performed to promote ulcer healing.

Topical cyclosporin A is an immunomodulator that can be used to minimise topical steroid use and reduce the likelihood of steroid related complications. Four times per day dosing is advised although most patients find the drop stings and may use it twice per day to minimise discomfort. Onset of action is over a few weeks. Restasis (cyclosporin 0.05%) is the commercially available US preparation.

In Australia specific written approval must be obtained for each patient through the Therapeutic Goods Administration via the 'Special Access Scheme' to use Restasis. The cost to the patient is about $700 for a six-month supply. A clear benefit has not been established for Restasis in AKC and VKC at this dose.[1] A locally manufactured 1% cyclosporin preparation in polyvinyl

Vernal keratoconjunctivitis usually affects children younger than 10 years; atopic keratoconjunctivitis strikes adults

limit severity

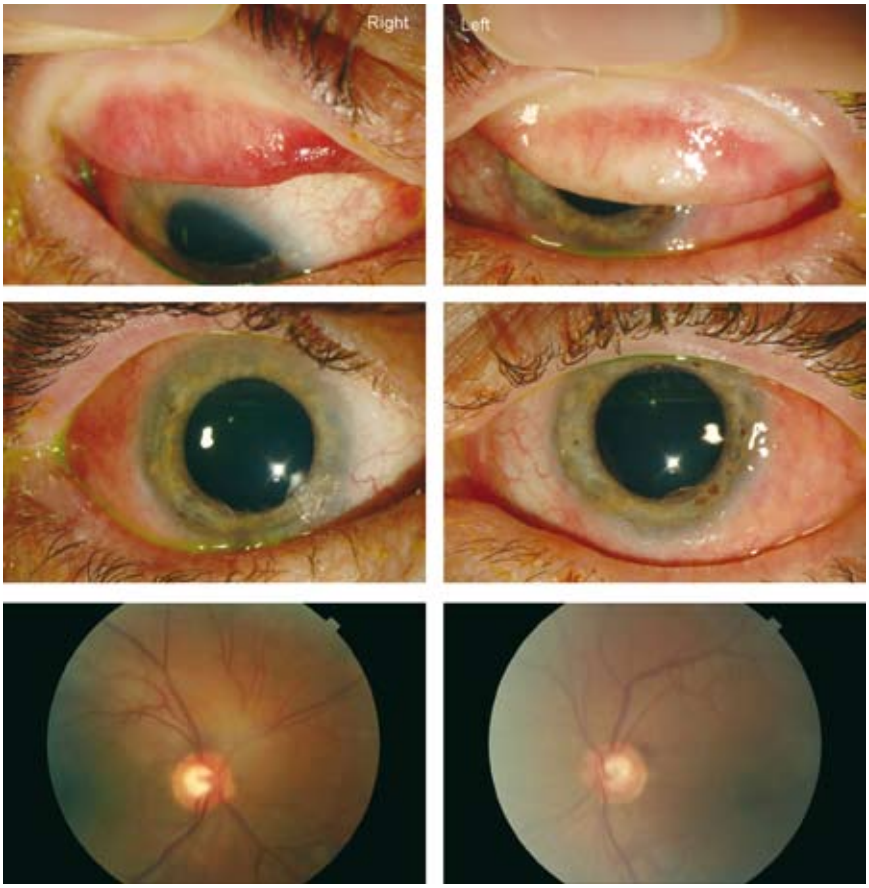


Figure 2. Images at presentation

alcohol is more easily accessible in Melbourne and possibly more efficacious by virtue of a greater concentration. The cost to the patient is only $35 a month.

Topical antihistamine-vascoconstrictor preparations (Antistine-Privine, Naphcon-A, Visine Allergy with Antihistamine, for example) do not generally have a role in the management of severe allergic eye disease such as VKC and AKC. Unfortunately, they have limited efficacy and the vasoconstrictor component causes a rebound redness after a few weeks of use. Topical non-steroidal anti-inflammatory agents, for example Acular (ketorolac 0.5%,), and selective histamine antagonists such as Livostin (levocabastine 0.05%) have only a limited role.

Generally patients are aware of what precipitates their allergy. It is usually not necessary for them to see a clinician prior to commencing prophylactic therapy such as Patanol or Zaditen. Commencing treatment promptly is likely to limit the severity of an acute exacerbation. A patient, for example, with VKC and a history of Spring exacerbations can be advised to commence a combined mast cell stabiliser histamine receptor antagonist in September prior to the anticipated onset of symptoms.

There is also some role, for the appropriate patient with at least moderate to severe disease, of allowing self-initiation of topical steroid drops for acute exacerbations. Obviously, the clinician needs to use their judgment to determine the appropriate patient. The patient should understand the potential side-effects and the importance of not continuing the medication without clinician review. They must be instructed that they need to present within five to seven days of commencing the topical steroid or even earlier if there is not an immediate therapeutic response. A script for Flarex can be provided (without the option of repeats) to be used four times per day.

Generally, steroid use should be minimised, particularly for VKC where the natural history is relatively good and many resolve by adulthood. FML drops can be used during the taper phase where the patient requires steroid drops longer than a few weeks. This might be the case in a patient with AKC and corneal vascularisation.

The following case exemplifies some of the principles of treatment of these two conditions.

Case report

Atopic keratoconjunctivitis

A 32-year-old man with a history of AKC presented with a two-week history of increasingly red, itchy eyes. The accompanying referral letter indicated a longstanding history of severe allergic conjunctivitis with corneal peripheral vascularisation and limbal inflammation requiring topical steroids. He was also reported to be a steroid responder with pressure rises into the mid-40s. Ultrasound measured pachymetry was 540 µm bilaterally. His treatment at the time of presentation was Maxidex tid, Patanol and Alphagan bd to both eyes.

Corrected vision with his current spectacles (Right -6.50/-1.00 x 60; Left -6.50/-1.50) was 6/9 and 6/15 on the right/left. Intraocular pressures were 28/34 mmHg. The perilimbal conjunctiva demonstrated hyperaemia and chemosis (Figure 2).

Continued page 12

Allergic conjunctivitis

From page 11

> **Generally patients are aware of what precipitates their allergy. It is usually not necessary for them to see a clinician prior to commencing prophylactic therapy such as Patanol or Zaditen.**
>
> Ben Connell

The cornea demonstrated widespread punctuate staining bilaterally and superior superficial neovascularisation. Posterior segment examination was unremarkable and in particular, both optic nerves were healthy with no inferior neural retinal rim thinning.

The Maxidex was stopped and not other treatment changes made.

He was asked to attend three days later for a pressure check which confirmed pressure of 19/21 mmHg. At the next scheduled appointment two weeks later he still complained of sore eyes and had decided to stop the Alphagan drops. Topical Cyclosporin A 1% was commenced twice per day. His symptoms gradually improved over six weeks.

Topical steroid drops were not commenced in this patient. Flarex could be considered two to four hourly although they would need to be tapered relatively quickly over one to two weeks and the intraocular pressure monitored closely. Flarex is a more appropriate topical steroid in this scenario compared with Maxidex or Prednefrin Forte for a possible lower risk of inducing a steroid-related pressure rise. Fortunately this patient does not exhibit signs of glaucoma with normal optic nerve morphology. Prior Humphrey visual field assessments failed to identify any field defect.

Alphagan (bromonidine 0.2%) is not a good choice of ocular hypotensive agent, given the high incidence of local reaction. Prostaglandin analogues are theoretically pro-inflammatory and should be used with caution. This leaves a beta blocker as the main option, provided the patient has no history of asthma. In this case, if the allergy was controlled off steroids a trial of no ocular hypotensive could be considered with close intraocular pressure monitoring.

Corneal topography was performed as the patient was myopic with astigmatism and keratoconus is associated with AKC. Keratoconus is important to diagnose as, where the topography or refraction are progressive, collagen cross linking has been demonstrated to significantly reduce the rate of progression.[2] In this patient a Pentacam study indicated orthogonal astigmatism with relative inferior steepening and increased corneal power in the steep axes. This should be monitored by repeated corneal topography and cross-linking should be considered if the condition progresses.

References

1. Daniell M, Constantinou M, Vu HT, Taylor HR. Randomised controlled trial of topical cyclosporine A in steroid dependent allergic conjunctivitis. *Br J Ophthalmol* 2006; 90: 461-464.
2. Wittig-Silva C, Whiting M, Lamoureux E et al. A randomized controlled trial of corneal collagen cross-linking in progressive keratoconus: preliminary results. *J Refract Surg* 2008; 24: S720-S725.

Andrew Hogan
BScOptom

Botox or a big contact lens: which would you prefer?

The relatively common anterior eye condition superior limbic keratoconjunctivitis (SLK) may be best treated with injections of Botox rather than with a large diameter bandage contact lens.

In this study, eight patients with SLK were fitted with large diameter hydrogel contact lenses for seven days, and followed up for one month. Clinical symptoms improved after about four days and corneal staining improved after about 10 days. Five of the patients showed recurrence of the SLK within one month of wearing the contact lens. They were treated with an injection of Botulinum Toxin A to the pretarsal orbicularis muscle. These patients showed distinct improvement within seven days of the injection, and the effect was maintained for between two and seven months.

The study makes no mention of whether there was a decrease in lines, wrinkles or the visible signs of ageing, nor of whether the patients' facial expressions became blank and emotionless. Further studies in this area are warranted.

Kim JC, Chun YS. Treatment of superior limbic keratoconjunctivitis with a large-diameter contact lens and botulium toxin A. *Cornea* 2009; 1 Jul (e-pub ahead of print).

How high is that meniscus?

The instillation of fluorescein does not affect normal tear meniscus height (TMH) measurements, and fluorescein is washed out of the lower tear meniscus after five minutes, according to this study. The researchers note that the tear meniscus is higher in the nasal and temporal areas compared to the centre of the lower lid.

The study looked at three methods of measuring the TMH: absolute method (TMH-A), reflex method (TMH-R) and with fluorescein (TMH-F). An eye-piece graticule on the slitlamp was used for the actual measurements. The reflex method resulted in slightly lower measurements than the other two methods but no significant difference was found between the absolute method and the fluorescein method. This is significant because, for the majority of observers,

Abstracts

tear meniscus assessment is made significantly easier by the instillation of fluorescein, and the presence of fluorescein does not affect the result.

For those keeping score, the average TMH-A measurement in the subject group of 34 people was 0.25 millimetres, and 0.27 millimetres when measured with fluorescein (TMH-F). Why would anyone want to measure the height of the tear meniscus?

García-Resúa C, Santodomingo-Rubido J, Lira M et al. Clinical assessment of the lower tear meniscus height. *Ophthalmic Physiol Opt* 2009; 30 Jun (e-pub ahead of print).

Cataract surgery gives you dry eye and shrinks your meniscus

Why measure the tear meniscus? I'm glad you asked. Cataract surgery may indeed lead to dry eye and a grooved incision can aggravate symptoms during the early post-operative period, even in patients without pre-operative dry eye. Long exposure to microscope light can also have an adverse effect on dry eye.

Fourteen patients with pre-operative dry eye and 35 patients without dry eye were studied. Tear break-up time, Shirmer test, tear meniscus height and subjective symptoms were measured and correlated against corneal incision location, shape, microscope light exposure time and phaco energy.

The dry eye group showed significantly worse symptoms two months post-op, and lower tear meniscus height at three days, 10 days, one month and two months. In the non-dry eye group, all dry eye test results were worse after surgery. Incision location appeared to make no difference; incision shape also made little difference, but a superior grooved incision appeared to result in worse symptoms and a poor tear break-up time for the non-dry eye patients. The correlation between exposure to the microscope light and dry eye appeared in both groups. Phaco energy appeared to have no effect.

Optometrists are well aware that dry eye symptoms are common following cataract surgery. Not surprisingly, patients with dry eye will continue to have dry eye following surgery, but even for those patients who are asymptomatic, perhaps dry eye tests should be a routine part of cataract post-op checks—and don't forget to measure that meniscus.

Cho YK, Kim MS. Dry eye after cataract surgery and associated intraoperative risk factors. *Korean J Ophthalmol* 2009; 23: 2: 65-73.

One day may be enough

It seems that the use of topical antibiotics for one day prior to anterior eye surgery is as efficient in reducing pre-operative conjunctival bacteria as three days of use. Presumably, it is also three times easier and one-third of the cost.

A study compared the efficacy of a one-day application of topical 0.5 per cent moxifloxacin to a three-day application, prior to ocular surgery. One hundred and forty-four patients were randomly assigned to either the one-day or three-day group, using the drops four times a day. Cultures were obtained at baseline, after antibiotic use, after povidone-iodine application just before surgery and once after surgery. At baseline, the number of eyes with positive cultures was similar, and this similarity was maintained at all the other time intervals. Staphylococcus was the most commonly isolated bacteria.

Deep eye infection following ocular surgery is potentially the most devastating of post-operative adverse events. Reducing the amount of conjunctival bacteria is vital to reduce the chance of infection, but because the instillation of the pre-operative antibiotics usually must be done by the patient, compliance is an issue. This study suggests that one day's worth of drops may be enough. Does this increase compliance? Who knows?

He L, Ta CN, Hu N et al. Prospective randomized comparison of 1-day and 3-day application of topical 0.5% moxifloxacin in eliminating preoperative conjunctival bacteria. *J Ocul Pharmacol Ther* 2009; 3 Jun (e-pub ahead of print).

How good are fluoroquinolones?

Pretty good, actually. This study looked at the microbial causes of severe bacterial keratitis, and the level of resistance to fluoroquinolone antibiotic drops, and found that, except for the streptococcus species, fluoroquinolones such as ciprofloxacin were an extremely effective treatment and showed almost no resistance.

Fifty-seven patients presenting with severe bacterial keratitis over 20 months were studied. *Pseudomonas aeruginosa* was isolated in 17 cases, *Staphylococcus aureus* in 16 cases, and coagulase-negative *staphylococcus* in 10 cases. These were by far the most common bacteria encountered. *P. aeruginosa* was sensitive to ciprofloxacin in 100 per cent of cases, *Staph aureus* in 94 per cent of cases, and coagulase-negative *staph* in 100 per cent of cases. There was also no difference noted across the study between the major fluoroquinolones: ciprofloxacin, levofloxacin or moxifloxacin.

All primary care practitioners should be aware of drug resistance, especially to older classes of antibiotics. It is good to know that, of the majority of organisms that are responsible for serious corneal infections, our frontline antibiotics still appear to be effective—unlike the Australian bowling in the Lord's test match this year.

Mesplié N, Kérautret J, Léoni S et al. Severe bacterial keratitis and activity of fluoroquinolones. *J Fr Ophtalmol* 2009; 32: 4: 273-276.

Blurry vision? It could be tuberculosis

Consumption may have been more common in Charles Dickens's novels but this case demonstrates that it is still around. A 56-year-old woman suffered rapid bilateral vision loss following a prolonged period of fatigue and intermittent headache.

Optometrists in private practice commonly see patients with blurred vision, tired eyes and headache. A diagnosis of eyestrain is not unreasonable under these circumstances. In this case, the cause was more sinister and much less common—she was suffering from active tuberculosis. She showed no obvious sign of ocular inflammation but ultrasound revealed evidence of bilateral posterior scleritis, and from this and subsequent investigations the diagnosis of tuberculosis was made. Quadruple anti-tuberculosis therapy was instituted, with the addition of intravenous prednisolone, which promptly improved the ocular symptoms.

The case is also interesting as it shows that an eye with posterior scleritis may appear quiet on external examination, and the importance of considering systemic conditions like tuberculosis in the differential diagnosis of posterior ocular inflammation. If only Tiny Tim had had an eye examination, Scrooge would have been off the hook.

Chen FK, White A, Harney BA. Systemic tuberculosis presenting with bilateral visual loss. *Br J Ophthalmol* 2009; 9 Jun (e-pub ahead of print).

Dry eye syndrome

Jennifer Groehler
BA
Leonid Skorin Jr
DO OD FAAO FAOCO

Dry eye

Dry eye syndrome, also known as keratoconjunctivitis sicca, is a widespread problem. It impacts the quality of life for many patients, significantly affecting daily activities.[1] **It has been found to affect from five to 30 per cent of the population, varying with age.**[2]

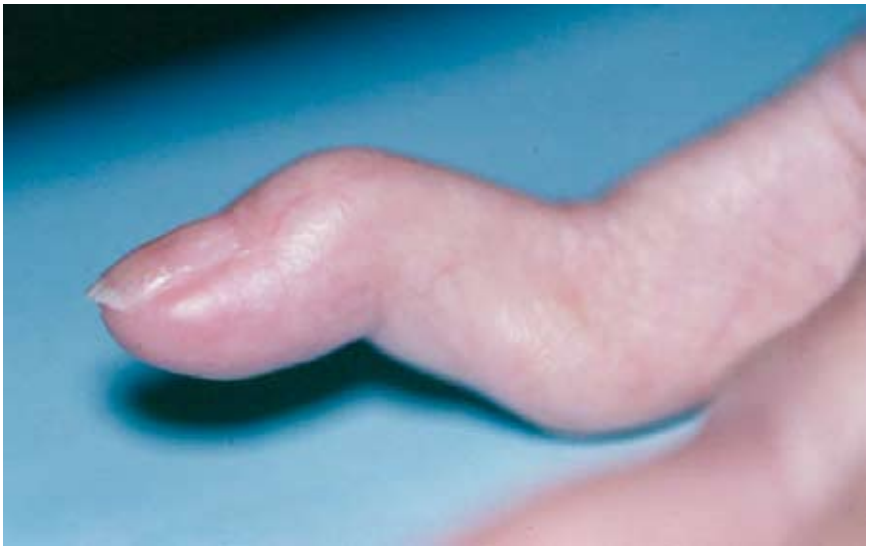
Dry eye syndrome has a higher association with female and elderly patients. It is common in patients with decreased corneal sensation which may be caused by viral infection or refractive surgery. It is associated with allergies, blepharitis and inflammatory conditions such as rosacea.[3] Hormonal changes and medications are linked to dry eye. Systemic autoimmune diseases, such as systemic lupus erythematosus, Sjögren syndrome (SS), thyroid disease and rheumatoid arthritis (RA), are also common causes of dry eye.[1,4] It may be caused or exacerbated by environmental conditions, such as low humidity, wind, long-term use of video display screens, contact lens wear, air conditioning and central heating.[1,5]

There are two major classifications of dry eye: insufficiency of tears (hyposecretive dry eye) and poor quality of tears (evaporative dry eye).[5] Often, both causes of dry eye occur simultaneously.[1] Evaporative dry eye is most commonly associated with meibomian gland dysfunction.[5] Hyposecretive dry eye may be classified as Sjögren or non-Sjögren; SS dry eye may be classified into primary or secondary SS. Primary SS is characterised by dry eye and dry mouth, but is not associated with a systemic autoimmune disorder. Secondary SS is associated with an autoimmune disorder, most commonly RA,[4,5] but most RA patients do not have SS.[6]

Rheumatoid arthritis

Rheumatoid arthritis is a chronic autoimmune disease that begins most frequently between the ages of 30 and 50 years, although it is also seen in children.[7] **Prior to menopause, women are affected three times more frequently than men.**[7,8] **It appears to have no ethnic or racial predilection.**[8]

The cause of RA is not fully understood, though both genetic and environmental factors are believed to play a role.[9] RA progression is variable; it can be transient, remitting, chronic and persistent, or rapidly progressive in its course.[7]



Deformation in the hands of a patient with advanced rheumatoid arthritis. Hyperflexion of the proximal interphalangeal joints (PIP) results in swan neck deformity.

Although dry eye is the most common ocular effect of rheumatoid arthritis, episcleritis, scleritis and corneal complications may also occur

and rheumatoid arthritis

Rheumatoid arthritis causes a thickening of the synovium and synovitis, which results in arthritis. It most commonly affects multiple joints (polyarthritis), and first affects smaller peripheral joints, usually symmetrically.[7] Rarely, patients present with asymmetric involvement of a few joints.[9] This initial joint stiffness typically presents gradually, over weeks to months.[7,8] Joints most commonly affected include the metacarpophalangeal (MCP), proximal interphalangeal (PIP) and distal interphalangeal (DIP) joints of the hands and metatarsophalangeal joints of the feet.[8] Hips are unlikely to be affected by early disease, although shoulders, elbows, wrists, knees and ankles may be affected.[7]

Rheumatoid arthritis has other non-articular manifestations. RA can cause tenosynovitis, muscle wasting, intrapulmonary nodules, pulmonary pleurisy, secondary amyloidosis, vasculitis, neuropathies, nephritic syndrome, carpal tunnel syndrome, Raynaud phenomenon, pericarditis, myocarditis, subcutaneous nodules, anaemia, and Felty's syndrome (splenomegaly and neutropenia).[5,7,8]

Ocular effects of RA include episcleritis, scleritis and corneal complications.[8,9] RA associated scleritis is commonly of the scleromalacia perforans type (necrotising scleritis without inflammation). The term scleromalacia perforans may be misleading because perforation rarely occurs.[8] The episcleritis associated with RA is usually diffuse but may be nodular.[8] Corneal complications of RA include keratomalacia, sclerosing keratitis, stromal keratitis, peripheral corneal furrowing, and keratoconjunctivitis sicca.[8] Dry eye is the most common ocular complication of RA.[8]

Diagnosis of dry eye

Many practitioners diagnose dry eye based on patient symptomology. This method should be pursued with caution as it has been found that symptoms of dry eye are not always in proportion to the severity of the condition.[1] Symptoms of dry eye include variable vision between blinks, ocular irritation, foreign body sensation, dry or gritty feeling, tired eyes, itching, photophobia, burning sensation, and pain with blinking.

Signs of dry eye should also be considered when making the diagnosis of keratoconjunctivitis sicca. These include conjunctival injection, punctate epithelial erosions, meibomian gland dysfunction, reduced tear production, tear debris, mucous plaques, devitalised tissue, filamentary keratitis, elevation of tear osmolarity, decreased tear break-up time (TBUT) and a decreased tear meniscus.[1,5]

Quantity of tears can be assessed via the Schirmer tear test but at least one study found the Schirmer test to be unreliable due to high intrasubject variability.[1] Tear quality is often assessed via the TBUT. Fluorescein ophthalmic dye is used to assess corneal surface irregularities caused by dry eye. Rose Bengal ophthalmic stain has traditionally been used to visualise epithelial cells deprived of mucous protection, and conjunctival surface irregularities. Lissamine green can be substituted as it is less irritating/toxic to the eye.[10] One study found that a mixture of 2% fluorescein and 1% lissamine green worked best for simultaneous corneal and conjunctival staining in the detection of dry eye.[10]

It is best to consider multiple factors when diagnosing dry eye, including patient symptomology and objective signs. No one test is definitive for dry eye, so multiple tests should be considered. Once the diagnosis of dry eye is made, it is pertinent to determine the cause of the dry eye as well, to provide the best care for the patient.

Differential diagnosis of rheumatoid arthritis as the cause of dry eye

Of all systemic autoimmune diseases, dry eye is most frequently associated with RA. More than 90 per cent of RA patients have dry eye, both in patients with and without secondary SS.[6,11] Interestingly, an association has been found between dry eye severity and RA activity in patients who have secondary SS, yet is not present in RA without SS.[11] This suggests a different mechanism for dry eye in the two conditions. Differential diagnoses of RA with or without SS is important, because these two subgroups may respond differently to dry eye therapy. A salivary gland biopsy will differentiate SS dry eye from non-SS dry eye.[4] In addition, ocular dryness should be evaluated in all RA patients, regardless of their current RA activity. RA activity is not always correlated to changes in dry eye.[6]

Diagnosis of RA early in the course of the disease is difficult yet important. Early treatment with a combination of anti-rheumatic drugs has been shown to help prognosis and slow progression.[9] An astute clinician will be looking for clinical presentation of early RA in dry eye patients.

The following articular signs may be

Continued page 16

Dry eye syndrome and rheumatoid arthritis

From page 15

present: warm, swollen, tender joints with weakness that is disproportional to joint tenderness.[9] Joint pain is worse in the morning and improves with daily activity, in contrast to osteoarthritis where joint pain increases throughout the day.[7]

RA eventually leads to deformity of the hands, which is easily assessed clinically. Ulnar deviation occurs when the fingers bow outwards at the metacarpophalangeal joints. Swan neck deviation and boutonniere deformity may also occur in the fingers (Figure).[7] RA patients often report fever, malaise, weight loss, fatigue and sleep disturbance.[7,8]

If RA is suspected in a patient with dry eye syndrome, further assessment is needed. There is no single test for diagnosis of rheumatoid arthritis,[9] which is typically diagnosed based on clinical presentation.[8,9] Diagnostic guidelines have been set by the American College of Rheumatology (Table).[7]

Diagnostic laboratory tests for RA include complete blood cell count with differential, rheumatoid factor (RF), erythrocyte sedimentation rate (ESR), and C-reactive protein, as well as joint aspiration.[9] Seventy per cent of patients with RA will test positive for RF in their serum, so it is not a definitive test. However, those patients with RA who test negative for RF often have a progressive clinical course, while those with a high titer tend to acquire greater disability from the disease.[7] Additionally, normal individuals without RA may test positive for RF.[9] Patients with suspected RA should be referred to a rheumatologist, especially if ESR, C-reactive protein and RF are elevated, or significant symptoms are present with six or more affected joints.[9]

Diagnostic features of rheumatoid arthritis: four or more of the following features are needed for diagnosis or RA

- Morning stiffness > 1 hour for at least 6 weeks
- Arthritis of 3 or more joints for at least 6 weeks
- Arthritis of joints in the hands and wrists for at least 6 weeks
- Symmetrical arthritis
- Subcutaneous nodules
- Positive serum rheumatoid factor
- Radiologic changes characteristic of RA

Adapted from the American College of Rheumatology[7]

Dry eye treatment

Tears are important for ocular health. They function to provide nourishment to the cornea, lubricate ocular tissues, and protect the eye by washing away debris and providing anti-microbial defense.[1,5] Tears also act as the initial refracting surface for the eye, and they smooth out minor corneal surface irregularities.[1,5] The goal of dry eye treatment is to establish an acceptable tear quantity and quality to maintain tear function.

Dry eye treatment often starts with use of topical therapeutics. A unique topical treatment for dry eye is cyclosporine A (Restasis; Allergan), an immune modulator that suppresses inflammatory causes of dry eye.[1] There are many topical dry eye treatments available, including a variety of solutions, gels and ointments. Often these topicals are available in non-preserved formulations, as preservatives may exacerbate ocular dryness and irritation.

Artificial tears rehydrate the ocular surface but the effect of artificial tears is often short-lived and hypersensitivity may develop to preservatives found in some solutions.[5] Mucolytic agents may be used to break up mucous plaques. Anti-histamine and mast cell stabilisers can be used to treat allergic causes of dry eye. Topical corticosteroids are often used when other topical therapeutics are not effective, usually in temporary or pulse-dosing fashion.[1] In severe dry eye, autologous serum may be used.[1]

Often warm compresses and lid scrubs may be recommended for dry eye, especially when associated with blepharitis or meibomianitis. Oral doxycycline may be prescribed in patients with rosacea or meibomianitis. Oral cholinergic agents, such as pilocarpine, have been prescribed to patients with SS and have also been shown to decrease dry eye symptoms.[5] Omega 3 fatty acids have anti-inflammatory properties and are commonly recommended to patients with dry eye.[1]

Other treatments for dry eye include punctal occlusion, via plugs or surgical cautery. Tarsorrhapy or lid weights may be used to decrease the ocular surface area from which tears can evaporate. Moisture chambers, such as goggles, may also be used. Additionally, environmental modifications such as a reduction of room temperature or increase of room humidification may significantly impact dry eye.[5]

Conclusion

Dry eye syndrome may be a symptom of a serious systemic condition such as rheumatoid arthritis. It is important to diagnose and treat dry eye to restore tear function and it is equally important to determine any systemic cause of dry eye. Clinical evaluation and laboratory testing should be carried out in all dry eye patients for whom the practitioner suspects an underlying cause of RA. Early diagnosis and treatment of RA is critical to improve prognosis and slow the course of the disease.

References

1. Lemp MA. Advances in understanding and managing dry eye disease. *Am J Ophthalmol* 2008; 146: 3: 350–356.
2. Lemp MA, Baudouin C, Baum J et al. The definition and classification of dry eye disease: report of the definition and classification subcommittee of the international dry eye workshop. *Ocular Surf* 2007; 5: 75-92.
3. Kruszka P, O'Brian RJ. Diagnosis and management of Sjögren syndrome. *Am Family Phys* 2009; 79: 6: 465-470.
4. Akpek EK, Klimava A, Thorne JE et al. Evaluation of patients with dry eye from presence of underlying Sjögren syndrome. *Cornea* 2009; 28: 5: 493-497.
5. Kanski JJ. Clinical Ophthalmology: A Systematic Approach, 5th ed. USA: Butterworth-Heinemann, 2003; pp 707-708.
6. Fujita M, Igarashi T, Kurai T et al. Correlation between dry eye and rheumatoid arthritis activity. *Am J Ophthalmol* 2005; 140: 5: 808-813.
7. Kumar P, Clark M. Clinical Medicine, 6th ed. USA: Elsevier Saunders, 2005; pp 555-564.
8. Skorin L. Rheumatoid arthritis can be accompanied by a range of ocular manifestations. *Prim Care Optom News* 2004; 9: 2: 32.
9. Majithia V, Geraci SA. Rheumatoid arthritis: diagnosis and management. *Am J Med* 2007; 120: 936-939.
10. Korb DR, Herman JP, Finnemore VM et al. An evaluation of the efficacy of fluorescein, rose Bengal, lissamine green, and a new dye mixture for ocular surface staining. *Eye Contact Lens* 2008; 34: 1: 61-64.
11. Lemp M. Dry eye (keratoconjunctivitis sicca), rheumatoid arthritis, and Sjögren's syndrome. *Am J Ophthalmol* 2005; 140: 5: 898-899.

Ophthalmic use of povidone-iodine

Povidone-iodine is accessible, inexpensive and effective against bacteria, viruses, protozoa and fungi. No wonder it is an antimicrobial of choice.

Jennifer Groehler
BA
Leonid Skorin Jr
DO OD FAAO FAOCO

Elemental iodine is a member of the halogen family. It is one valance electron short of a stable octet. Thus, it readily accepts an electron from nearby molecules causing a disruption of biological activity.[1] **Iodine has been used for more than 150 years as an antibacterial agent.**[2] **It was first used in the form of a tincture (alcoholic solution), but this caused extensive staining and skin irritation.**[1,2]

In 1951 iodine was paired with polyvinylpyrrolidone, forming a water-soluble complex commonly referred to as povidone-iodine (PI).[2,3] The antimicrobial properties of PI stem from the small amount of free iodine rendered from the complex.[2] The free iodine is released as fast as it is exhausted. It attaches to prokaryotic cell walls, causing pore formation, cytosol leakage and cell death.[4,5] It also disrupts the electron transport chain.[1] These multiple mechanisms of disruption are likely to be responsible for its low rate of bacterial resistance.

Povidone-iodine is used worldwide as an antimicrobial agent. It is relatively inexpensive and readily available, making it an ideal antiseptic in both developed and undeveloped countries,[3,4] and its antimicrobial properties are broad. It is effective against most gram negative and gram positive bacteria, viruses, protozoa, and fungi, when given ample time to disinfect.[2,3,4,5] PI is notably effective against methicillin-resistant *Staphylococcus aureus* (MRSA), *Neisseria gonorrhoeae*, *Chlamydia trachomatis* and herpes simplex virus.[2,6] Additionally, bacterial resistance and allergic reactions are rare.[3,4] Toxicity to the skin and ocular tissues is low in the appropriate concentrations.[3] The yellow-brown coloration allows for easy visualisation of application, ensuring proper coverage.[3] Currently PI is intended for external use only.[7]

Povidone-iodine is also used in nursing homes and hospitals for disinfection and deodorisation. It absorbs gases such as ammonia, acetaldehyde, ethylmercaptan and hydrogen sulfide.[8] It is not a chemical of choice for cleaning blood, as blood is known to inhibit its antimicrobial activity.[5]

Ophthalmic use

Although PI was first used on the skin in 1951, it was not used on the ocular surface until much later.[3] In fact, doctors and nurses were originally trained to keep PI out of the eye.[9] Today PI is used as a periocular scrub and ocular irrigant prior to many ophthalmic procedures. It is applied to the cheeks, lids and brow (Figure). After appropriate contact time, the excess is wiped from the skin. A more diluted solution is applied to the palpebral fornices, bulbar conjunctiva and cornea. A sterile saline rinse of the

Periocular application of povidone-iodine (PI) prior to an intraocular injection. Excess PI will be wiped from the skin after appropriate contact time.

Ophthalmic use of povidone-iodine

From page 17

ocular surface may follow but is not always necessary. PI is considered safe and effective as a prophylaxis both prior to and after ophthalmic surgery, as well as intraocular injections.[4]

Povidone-iodine is not used as an intraocular prophylactic. It has been shown to cause retinal oedema and necrosis after intraocular injection in animal studies.[10] It has also been linked to opacification of silicone intraocular lenses (IOLs) during cataract surgery.[11] Because of potential toxicity and opacification of IOLs, many caution against accidental introduction of PI into the globe during surgery.[5,9] However, one study has found that diluted concentrations of PI (0.1% or less), at levels that are still bactericidal, do not cause toxicity to the corneal endothelium.[12] Thus, PI may be indicated as an intracameral prophylaxis following ocular surgery in the future.

Use of PI as a prophylactic for endophthalmitis prior to ophthalmic surgery is considered the standard of care.[1] Endophthalmitis is rare but serious. Its incidence in post-operative cataract surgery is reported to be between 0.5 and 1.0 per cent.[5,12] A pre-operative application of broad spectrum antibiotic three days prior to ocular surgery in conjunction with prophylactic PI just prior to the operation is highly effective in reducing endophthalmitis.[3] Additionally, post-operative application of a 2.5% PI solution significantly reduces bacterial colonies and species even 24 hours after surgery. This long-lasting effect was not seen in a comparative mixture of neomycin, polymyxin B and gramicidin.[3] Post-operative application of PI appears to be more effective than traditional antibiotics in reducing endophthalmitis risk.

Povidone-iodine has been indicated in the treatment of bacterial conjunctivitis and keratitis. A 1.25% PI solution is more effective than a mixture of neomycin, polymyxin B, and gramicidin for treatment of Chlamydia, and just as effective for other forms of bacterial conjunctivitis.[4] PI has also been suggested as an adjunct therapy to antibiotic treatment for corneal ulcers,[1] yet PI reduces proliferation and migration of fibroblasts and slows the healing process.[13] This should be taken into consideration when treating individuals with significant corneal compromise.

Povidone-iodine may be used to treat ophthalmia neonatorum, a bacterial conjunctivitis in neonates that occurs due to contact with *Neisseria gonorrhoeae* or *Chlamydia trachomatis* in the birth canal. Left untreated, ophthalmia neonatorum can lead to blindness.[3] Silver nitrate was traditionally used as a prophylaxis for this condition but it lacks effectiveness for *Chlamydia trachomatis*, so topical erythromycin or tetracycline is typically used.[14] A topical 1.25% PI solution is indicated as an alternative treatment. It is as effective as erythromycin and tetracycline, has lower risk of resistance, and is cheaper and more readily available.[3,4,14] Use of PI should especially be considered in undeveloped countries where other antibiotics are not available or are too costly.

Use of PI for treatment of viral conjunctivitis is controversial. Four times daily dosing with 1.25 % PI has been considered ineffective in treatment of acute viral conjunctivitis *in vivo*, regardless of other studies that have shown effectiveness *in vitro*.[4] PI has recently been included in a formulary developed for treatment of epidemic keratoconjunctivitis (EKC).[15] A one-minute soaking with 5% PI followed by irrigation with sterile ophthalmic solution is used to reduce viral load. Subsequent treatment with an ophthalmic nonsteroidal anti-inflammatory (NSAID) and loteprednol 0.5% ophthalmic suspension (Lotemax) reduces inflammation (FML of Flarex in Australia). This treatment regime decreases the healing time of EKC[15] yet some argue that PI treatment of EKC is unnecessary, as the infection is self-limiting.[15]

Recently, PI has been considered for contact lens disinfection. PI was compared with traditional contact lens solutions: hydrogen peroxide, polyhexamethylene biguanide (PHMB) and benzalkonium chloride (BAK).[16] Its effective concentration was lower than any of the traditional chemicals. It also caused the least amount of damage to cultured corneal epithelial cells. Although not currently a product for contact lens disinfection, its high safety profile and effectiveness make PI a good candidate.

Concentration, mode and duration of application

There is no universal agreement on the concentration of PI, nor the mode and duration of application used for ophthalmic purposes. Numerous studies have attempted to determine the best application mode and duration but these studies are compounded by multiple variables and indistinct endpoints.[1]

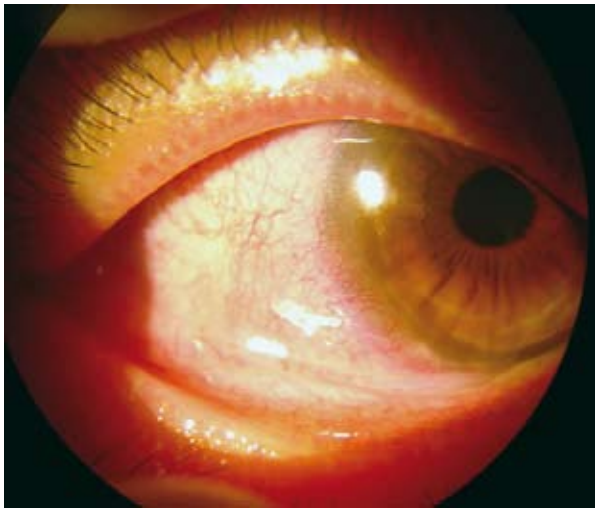
PI may be spread over the skin via a scrub or paint application. Several studies have revealed that a paint application alone is just as effective as a combination scrub and paint application.[2] PI can be applied to the ocular surface either via irrigation or an eye-drop soak.[5,7] Time allowed for skin disinfection ranges from approximately 30 seconds to seven minutes.[2] A one- or two-minute irrigation or soak is common for ocular application, often followed by a sterile saline rinse.[5,7] Given the wide range of application durations practised, it may be best to follow the recommended guidelines on the package insertion by the manufacturer.

Povidone-iodine is available in several formulations and concentrations.[2,5] It is obtainable in aqueous solution, alcohol solution, ointment or powder form.[2] A 10% PI solution is most commonly used for skin disinfection.[2] A more diluted solution, usually 5%, is used for ocular application.[3,5,17] Acidity decreases with dilution, resulting in a reduced likelihood of conjunctival irritation.[5] It is important to avoid using the detergent-containing PI scrub on the ocular surface, as it will damage the cornea.[3,9]

The percentage of free iodine in a PI solution increases with dilution, until the maximum amount is seen at 0.7%. Thus, it makes sense that *in vitro* studies have shown a paradoxical increase in antimicrobial activity in weaker solutions.[5] However, at least one in vivo study found that PI works better in stronger concentrations.[5] Blood, pus, sputum, fat and protein containing solutions found in vivo act as inhibitors to PI. This may explain why stronger solutions are actually more effective clinically.[2,5] Multiple studies have demonstrated the antibacterial effectiveness of a 5% PI ocular application prior to intraocular surgery, leading to a reduction in post-operative endophthalmitis.[3,5,17] Bacterial colonies were reduced by 91 per cent and species by 50 per cent after ocular application of 5% PI.[3] An *in vivo* study has found that 5% PI is more effective than 1% at reducing conjunctival bacteria, especially in heavy loads.[5] Therefore, the authors conclude that a 5% PI solution is more effective than weaker concentrations.

A separate study finds that 0.02% PI irrigation and 5% PI drops are equally effective.[18] In addition, irrigation with 5% PI is more effective than eye-drop instillation of 5% PI in reducing bacteria in the conjunctival fornix.[19] This demonstrates increased efficacy of irrigation versus drops (as bacteria are actively dislodged via irrigation). It also reinforces the importance of mode

Clinical QUIZ



A new 13-year-old male patient presented to the practice with a five-day history of irritated, red eyes that was more noticeable on the right eye than the left.

Careful case history revealed that the patient had had similar episodes at six to nine month intervals over the preceding three years. In most cases the signs and symptoms had resolved without treatment over five to seven days. On one occasion the patient had been treated by his general practitioner, and on another he had been treated by an ophthalmologist.

There was no prior history of spectacle wear. Presenting vision was R 6/9 PH 6/6 L 6/6. No significant refractive error was observed during retinoscopy in either eye.

Slit lamp biomicroscopy showed bilateral, bulbar conjunctival hyperaemia. In the right eye there was an associated limbitis that was marked in the superior and temporal quadrants. The anterior chamber was quiet in both eyes. On both the upper and lower tarsal conjunctiva a diffuse, velvet-like papillary conjunctivitis was observed. There were no cobblestone papillae on the superior tarsal conjunctival surface.

What are your diagnosis and management?

Answer page 20

and duration of application in addition to consideration of concentration. A minimum ocular irrigation time for each concentration of PI is not known.[5] Future study of this topic would prove beneficial.

Conclusion

Povidone-iodine is an effective disinfectant and antiseptic. Resistance is rare, as are hypersensitivities. It is widely used as a periocular and ocular prophylactic prior to surgery. Currently, it is considered the standard of care. It has been indicated as a treatment for conjunctivitis and an adjunct treatment for corneal ulcers. It may also be used as a prophylaxis for ophthalmia neonatorum. Use of PI should be considered, especially in undeveloped countries, as it is accessible and relatively inexpensive. It may even have a future as a contact lens disinfectant.

Variation is seen in use of PI concentration, mode of application and duration of disinfection time. While current studies have demonstrated effective methods of PI treatment, future studies are needed to further decipher the interplay of these variables. It is evident that PI is an antimicrobial of choice and will be widely used for ophthalmic purposes in the future.

References

1. Aberlson M, Capriotti J, Shapiro A, Lilyestrom L. Iodine: an elemental force against infection. *Rev Ophthalmol* 2009; 16: 5: 80-83.
2. Durani P, Leaper D. Povidone-iodine: use in hand disinfection, skin preparation, and antiseptic irrigation. *Int Wound J* 2008; 5: 376-387.
3. Isenberg SJ, Apt L. The ocular application of povidone-iodine. *Com Eye Health* 2003; 16: 46: 30-31.
4. Isenberg SJ, Apt L, Valenton M et al. A controlled trial of povidone-iodine to treat infectious conjunctivitis in children. *Am J Ophthalmol* 2002; 134: 681-688.
5. Ferguson AW, Scott JA, McGavigan J et al. Comparison of 5% povidone-iodine solution against 1% povidone-iodine solution in preoperative cataract surgery antisepsis: a prospective randomized double blind study. *Br J Ophthalmol* 2003; 87: 2: 163-167.
6. Benevento WJ, Murray P, Reed CA, Pepose JS. The sensitivity of Neisseria gonorrhoeae, Chlamydia trachomatis, and herpes simplex type II to disinfection with povidone-iodine. *Am J Ophthalmol* 1990; 109: 329-333.
7. Ophthalmic Drug Facts. Wolters Kluwer Health, Inc, 2007; chapter 11: accessed online Jun 21, 2009.
8. Ohta S, Nagai K, Maruyama M et al. Preparation and characteristics of antibacterial sepiolite containing povidone-iodine as a useful pharmaceutical product for patient care. *Bio & Pharm Bulletin* 1999; 22: 1: 42-47.
9. Speaker MG, Menikoff JA. Prophylaxis of endophthalmitis with topical povidone-iodine. Ophthalmol 1991; 98: 12: 1769-1765.
10. Alp BA, Elibol O, Sargon MF et al. The effect of povidone-iodine on the corneal endothelium. *Cornea* 2000; 19: 4: 546-550.
11. Goel S, Kolli LR, Desai SP, et al. Povidone iodine causes opacification of silicon intraocular lens implants. *Acta Ophthalmol* 2008; 86: 773-777.
12. Naor J, Savion N, Blumenthal M, Assia E. Corneal endothelial cytotoxicity of diluted povidone-iodine. *J Cataract Refract Surg* 2001; 27: 941-947.
13. Thomas GW, Rael LT, Bar-Or R et al. Mechanisms of delayed wound healing by commonly used antiseptics. *J Trauma* 2009; 66: 82-91.
14. Richter R, Below H, Kadow I et al. Effect of topical 1.25% povidone-iodine eyedrops used for prophylaxis of ophthalmia neonatorum on renal iodine excretion and thyroid-stimulating hormone level. *J Pediatr* 2006; 148: 401-403.
15. Melton R, Thomas R. Adenoviral infections: take charge of EKC. *Rev Optom* 2009; Suppl 10A–14A.
16. Yanai R, Yamada N, Ueda K et al. Evaluation of povidone-iodine as a disinfectant solution for contact lenses: antimicrobial activity and cytotoxicity for corneal epithelial cells. *Contact Lens Ant Eye* 2006; 85-91.
17. Trinavarat A, Atchaneeyasakul L, Nopmaneejumruslers C, Inson K. Reduction of endophthalmitis rate after cataract surgery with preoperative 5% povidone-iodine. *Dermatology* 2006; 212: 35-40.
18. Grimes SR, Hollsten D, Nauscheutz WF et al. Effect of povidone-iodine on the pre-operative chemical preparation of the eye. *Military Med* 1992; 157: 111-113.
19. Safar A, Dellimore MC. The effect of povidone-iodine flush versus drop application on conjunctival colonization before intravitreal injections. Int Ophthalmol 2007; 27: 5: 307-312.

Clinical QUIZ

Answer Vernal keratoconjunctivitis

This diagnosis of vernal keratoconjunctivitis (VKC) reflects the patient's age, the recurrent nature of his condition, and the signs and symptoms on presentation.

Treatment was commenced using FML (Allergan, Irvine) at a qid dose in both eyes for one week. This was tapered to tid for the second week, bid for the third week, and then qd until the bottle was finished. The patient was concurrently commenced on Zaditen (Novartis, Basel) eye-drops bid in both eyes for ongoing prophylaxis.

The first review was made at one week. At this time the patient's symptoms had resolved, as had the bulbar conjunctivitis. The tarsal papillary conjunctivitis had improved but not resolved. Vision had improved to R 6/6 L 6/6 without correction. Intraocular pressure was measured and found not to be elevated.

The next review was made at one month after initial presentation. At this time the FML eye-drops had been ceased three days prior. The patient remained on Zaditen eye drops bid in both eyes. All symptoms were resolved and there was minimal tarsal involvement remaining. The nature of vernal keratoconjunctivitis was discussed with the patient. The patient was encouraged to continue use of Zaditen eye-drops bid in both eyes. Further review was set for six months.

Vernal keratoconjunctivitis is an external eye condition that may be seen in younger patients. The presentation of VKC can vary from a very mild ocular surface allergic response in some patients, to sight threatening corneal shield ulcers in severe cases.

In almost all cases, patients who are diagnosed with VKC will have a chronic condition that waxes and wanes over many years. Many of these patients will have a gradual resolution of their condition during their late teenage years, but for some patients the condition will manifest as atopic keratoconjunctivitis into adulthood.

David Stephensen
BAppSc(Hons)(Optom) BBus
GradCertOcTher FCCLSA

Pathophysiology

VKC is a type I ocular allergy that is an IgE and IgG cell mediated response.[1] The disease process derives from IgE stimulated mast cell degranulation. The degranulation process releases histamine and this commences the symptomatic phase of the condition.

Signs and symptoms

VKC is typically bilateral in presentation, although the presentation may be asymmetric. It is a condition of youth; adults presenting with similar signs are classified as having atopic keratoconjunctivitis. The signs and symptoms wax and wane. This is a chronic condition throughout its course but the clinician will tend to encounter it during the episodic exacerbations. Traditionally the condition is held to have a seasonal course and exacerbation may coincide with the change in season. For some patients their cycle of exacerbation may be out of step with the seasons.[1,2]

Presentation of VKC varies with the severity of the condition. In a mild case the presentation will be that of velvet-like, papillary conjunctivitis with diffuse ocular surface hyperaemia. As the condition progresses the patient may present with large, cobblestone papillae on the superior tarsal conjunctiva. As the condition involves the cornea, limbus takes on a fleshy pinkish-white appearance. In chronic cases eosinophil deposition can occur at the limbus in discrete nummular deposits known as Tranta's dots. Where there is involvement of the superior tarsus, an accompanying toxic corneal epitheliopathy may develop. This can manifest as superficial punctate erosions and as an inflammatory shield ulcer in severe cases.[1,2]

Management

In very mild cases, VKC may be managed by providing symptomatic relief. This can take the form of regular cold compresses throughout the day.[1,3] If this fails to provide adequate relief, topical antihistamine agents, or combination antihistamine and mast cell stabiliser agents can be useful.[2,3,4]

In regularly recurrent mild disease, the use of mast cell stabilisers or combination antihistamine and mast cell stabilisers for prophylactic suppression may be useful.[4] In chronic cases with a detailed history it may be possible to predict the most likely time for recurrence and these agents may be commenced one or two weeks prior to this time.

In more significant cases where there is superior tarsal and limbal involvement, there may be a need for topical corticosteroid agents to resolve the episode.[1,2,3,4] These are typically prescribed as a tapering course over several weeks. As with all use of topical corticosteroid agents there is a need to monitor for side-effects, principally elevation of intraocular pressure. It is not uncommon to use mast cell agents or combination antihistamine and mast cell agents in combination with topical corticosteroid agents to provide long-term prophylactic coverage in cases with frequent recurrence. These mast cell or combination antihistamine and mast cell agents are continued after the cessation of the topical corticosteroid agents.

In cases of shield ulceration, consideration should be given to referral to a corneal specialist or tertiary referral hospital for more urgent assessment.

References
1. Ehlers WH, Donshik PC. Allergic ocular disorders: a spectrum of diseases, *CLAO Journal* 1992; 18: 117-124.
2. Bruce AS, Loughnan MS. Anterior Eye Disease and Therapeutics A-Z. Edinburgh: Butterworth Heinemann, 2003.
3. Coutu RB. Treatment of vernal keratoconjunctivitis: a retrospective clinical case study. *Opt Vis Sci* 1991; 68: 561-564.
4. Wakefield D, McCluskey PJ. Vernal keratoconjunctivitis. *MJA* 2006; 185: 523.

Phoenix, Arizona

Letter from the **USA**

Art Epstein
OD FAAO
Phoenix, Arizona USA

I was not yet out of optometry school three decades ago when West Virginia became the first state in the USA to grant optometrists therapeutic authority. Looking back, that single step changed forever the face of our profession throughout the world. In the virtual blink of an eye, our profession leaped from a limited vision focus to become the primary provider of eye care in the USA and other countries throughout the world. We have never looked back.

As I travelled around the USA on the lecture circuit over the past decade, I discovered that the most successful optometric practices, those with the broadest scope, had embraced allergy treatment early. Why is this so and why is embracing allergy management so important for optometry?

Recognising ocular allergy and becoming expert in its management meet unmet medical needs. The typical therapeutic latency of a modern topical anti-allergy combination agent is less than three minutes. The relief provided is so rapid that the patient is easily able to tie the therapeutic effect to the medication, often still in their hand.

Allergy is a life-disrupting and often disabling disorder. Ocular allergy can be particularly vexing. Effective treatment brings rapid relief and by doing so, links the prescriber directly to the therapy with the actual prescription serving as a conduit of his or her therapeutic authority. Therapeutic success inspires confidence, insures loyalty and increases new patient referrals.

Treating ocular allergy presents tremendous opportunity for practice growth. In optometric waiting rooms throughout the world, allergy is often the tip of an iceberg sometimes masked by other presenting problems.

According to the Australasian Society of Clinical Immunology and Allergy, nearly 20 per cent of Australians are affected by allergy resulting in a cost to the economy of more than $7 billion each year. In the USA, somewhere between 50 and 80 per cent of all allergy suffers have ocular involvement. That translates into at least 10 per cent, and more likely 20 per cent or more, of a typical practice's patients potentially benefiting from ocular allergy treatment.

Beyond meeting patients' needs and growing your practice, treating ocular allergy presents an opportunity for personal growth as a clinician. The rapid feedback and the bonds it creates with patients lead to increased professional satisfaction. Our experience in the USA has shown this to be very much the case.

As both a colleague and a friend, I urge you to increase your focus on ocular allergy. I hope you find this aspect of practice as rewarding as I have.

Mucous filaments can result in significant pain. Because they mark an underlying

Filamentary keratitis

Ken Thomas
BScOptom FVCO

Filamentary keratitis is an uncommon corneal condition in which mucous filaments form in the precorneal tear film and then adhere at one end to damaged corneal epithelial cells. The non-adherent tail ends can be seen to float in the tear film, especially with blinking.

The filaments can result in significant pain as the lid movement drags the loose end of the filaments and stimulates the corneal nerve endings. In addition to foreign body sensation, patients often report mild photophobia, watering, persistent hyperaemia and occasionally a pseudoptosis.

Filamentary keratitis can occur as a response to a number of chronic corneal conditions, the most common being severe dry eye. Filaments can occur unilaterally or bilaterally, depending on the underlying corneal condition.

The filaments comprise mucin and degenerated epithelial cell components. They will stain with fluorescein but more dramatically with rose Bengal. They can range in length from 0.5 millimetres to several millimetres in length.

Associations

The conditions most commonly found with filamentary keratitis are:

- dry eye (aqueous deficient)
- superior limbic keratoconjunctivitis (SLK)
- recurrent corneal erosion
- neurotrophic keratopathy
- herpes simplex keratitis/herpes zoster keratitis
- post-operative patching
- corneal surgery such as grafting, or at suture sites
- chronic bullous keratopathy
- chronic ocular medication use.

Treatment

The filaments should be debrided with either jeweller's forceps or a cotton bud under topical anaesthesia at the slitlamp. Prophylactic topical antibiotics should be prescribed.

Filamentary keratitis should be considered not a disease entity but a marker of an underlying corneal problem. Every effort must be made to diagnose and treat the causative condition. The management will be altered by the diagnosis but also by the severity of symptoms and chronicity of the condition.

Once the filaments have been removed and the underlying condition has been diagnosed, any of the following treatments may be considered:

- intense lubrication (non-preserved artificial tears)
- punctal occlusion
- bandage contact lens
- topical steroidal and nonsteroidal anti-inflammatory agents
- hypertonic saline
- mucolytic eye-drops (Mucomyst).

Mucomyst is a medication that dissolves mucous. It is typically inhaled for the treatment of chronic bronchopulmonary diseases such as emphysema and asthmatic bronchitis in which mucous build-up obstructs the airways. It is sometimes used with chest surgery and post-traumatic conditions. It also is used both orally and intravenously for treatment of paracetamol overdose.

Mucomyst is not commercially available as an eye-drop but can be prepared by a compounding pharmacist. It can be used topically to dissolve the filaments in recalcitrant filamentary keratitis cases. It is usually prepared as a 5% or 10% solution, and typically applied four times per day. This can be formulated with preservatives or in a non-preserved form. In the later case, patients will need to discard the preparation shortly after opening.

Adverse reactions are uncommon. It is possible for patients to develop allergic responses to Mucomyst. Patients should also be warned about the 'rotten egg' smell of the eye-drops and be prepared to tolerate a high level of stinging and burning when applied to the eye.

Conclusion

Filamentary keratitis is a painful ocular condition that can take years to resolve in some cases. Optometrists have an important role in detecting and removing the filaments, and their access to topical therapeutic agents, punctual plugs and bandage contact lenses makes them ideally placed to manage the bulk of the underlying corneal conditions.

References

1. Albietz J, Sanfilippo P, Troutbeck R, Lenton LM. Review: Management of filamentary keratitis associated with aqueous-deficient dry eye. *Optom Vis Sci* 2003; 80: 420-430.
2. AS Bruce, MS Loughnan. Anterior Eye Disease and Therapeutics A-Z. UK: Butterworth Heinemann, 2003.
3. Douglas R Jr, Cullom MD, Chang MD. The Wills Eye Manual: Office and Emergency Room Diagnosis and Treatment of Eye Disease, 2nd ed. USA: Lippincott-Raven, 1994.

corneal problem, every effort must be made to diagnose and treat the cause.

Case 1

A 54-year-old male (Mr RH) presents with marked discomfort on blinking. Examination shows moderate meibomian gland dysfunction, panus and several filaments attached to the inferior third of the cornea (Figure 1).

While the filaments appear as circular deposits in the photograph, they uncoil on blinking and reveal themselves as fine strands, attached at one end to the corneal epithelium.

The filaments were removed at their base with jeweller's forceps under topical anaesthesia. A prophylactic topical antibiotic (chloramphenicol) was dispensed. Artificial tears were prescribed and lid scrubs, hot compresses and massage were advised for the concurrent lid condition.

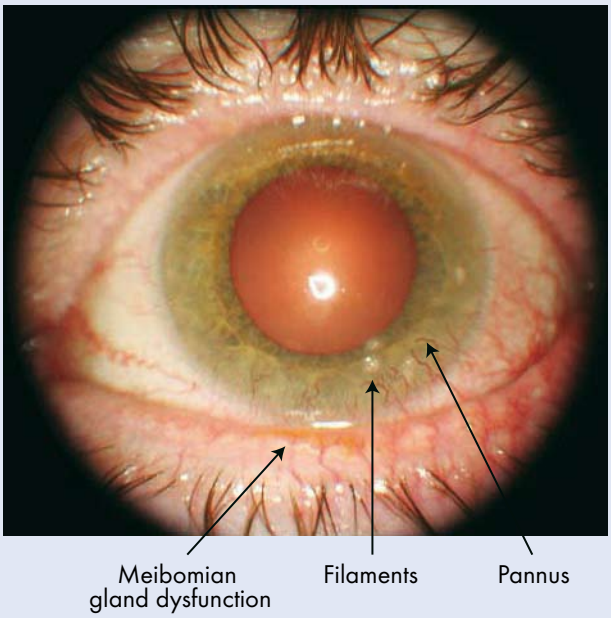


Figure 1. Mr RH: the filaments appear as circular deposits but uncoil on blinking and reveal themselves as fine strands, attached at one end to the corneal epithelium

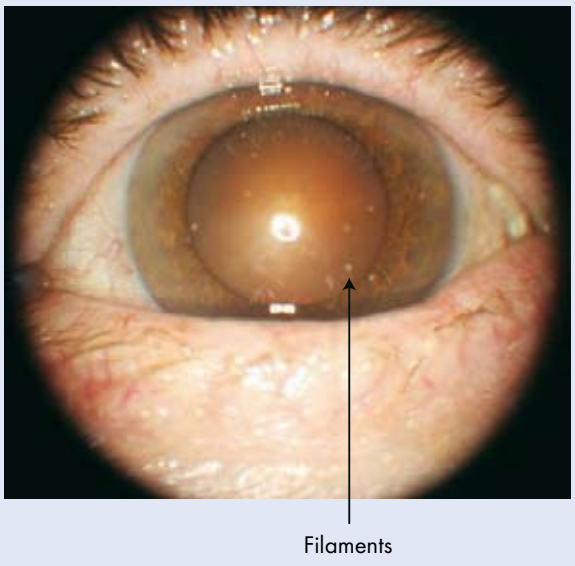


Figure 2. Mrs EB: filaments attached to a bandage contact lens

Case 2

A 63-year-old female (Mrs EB) presented requesting a replacement of her left bandage contact lens. She states that she has been wearing bandage contact lenses for several years as part of her treatment for filamentary keratitis. Slitlamp examination shows multiple filaments attached to the bandage contact lens (Figure 2).

A more detailed history determines that she has experienced recurrent left herpetic eye disease and has had 108 ophthalmic consultations in the past five years due to persistent filament formation. Her condition has not improved with the use of lubricants. Her ophthalmology team has been endeavouring to reduce her dependence on bandage contact lenses by using Mucomyst (Acetylcysteine 10%) eye-drops.

Subsequent reviews of the patient proved that this was ultimately successful, although the patient complained intensely about the stinging and awful 'rotten eggs' odour of the drops. ■

Systemic drugs can intraocular pressure

Dr Ridia Lim
MB BS MPH FRANZCO
Cataract and glaucoma specialist

Drugs that are given as eye-drops, local injections, intravitreal injections, nebulisers and tablets—both prescribed and over-the-counter—and non-medicinal orally ingested substances are all potential causes of raised intraocular pressure (IOP) (Table page 27).[1] Practitioners need to be aware of this link and warn the 'at-risk' group of the glaucoma population.

Steroids

Corticosteroids elevate IOP in susceptible individuals.[2] In a study that looked at a population of normal eyes in the 16 to 40 years age bracket, four to six per cent experienced an IOP rise of greater than 15 mmHg after topical steroid treatment for four to six weeks.[3] These were high responders. The moderate responders made up one-third of the population and had an IOP rise of from 6 to 15 mmHg. The remainder, classified as non-responders, had a rise of less than 6 mmHg.

Further studies have shown that the steroid response is greater in certain groups such as those with open angle glaucoma or who have a first-degree relative with glaucoma, extremes of age (children, and people aged older than 40 years), diabetic patients, and those with high myopia and connective tissue diseases, especially rheumatoid arthritis.

The steroid response effect most marked with topical steroids and the steroid response seen after oral doses are about 60 per cent of the effect seen with topical therapy.[2] The relative potency varies between the corticosteroids with dexamethasone having the most potency, followed by prednisolone; fluorometholone (FML) has minimal effect on IOP. Steroid response can last up to six weeks following the cessation of topical or oral therapy.

With the advent of intravitreal administration of steroids for retinal disorders,

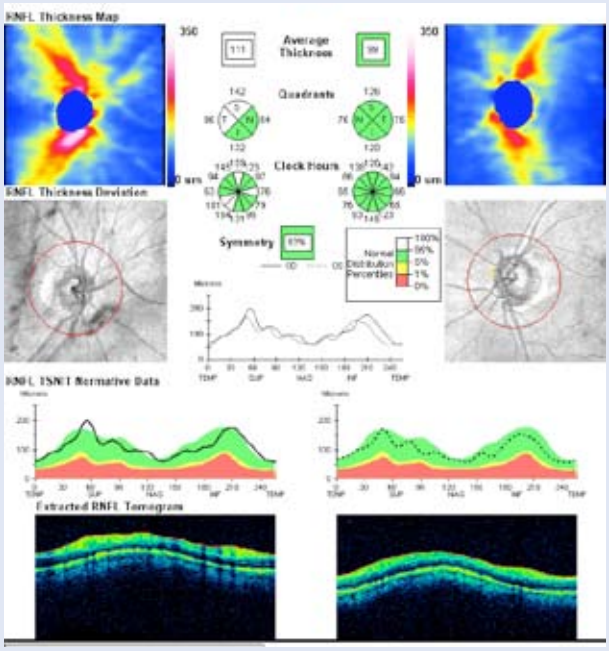


Figure 1. RNFL OCT (Cirrus): normal study with minor asymmetry in RNFL thickness

Case 1

A 75-year-old man with a history of diabetes develops macular oede ma following cataract surgery in the left eye. Intravitreal triamcinolone (IVTA) is given in July 2008 with good visual acuity recovery. Post-IVTA a steroid response develops and is sustained, which is not responsive to maximally tolerated medical therapy (MTMT). Nine months following IVTA on MTMT, the IOP was 38 mmHg. There is slight asymmetrical cupping also seen on retinal nerve fibre layer (RNFL) OCT with the Cirrus and there is a small relative afferent pupillary defect (RAPD) to support the structural difference. The perimetry is normal (Figure 1).

How do you manage this?

The steroid response glaucoma is treated with selective laser trabeculoplasty. Two days following SLT, the IOP is 17 mmHg and two months later, 10 mmHg. Steroid response can be treated with SLT.[4]

raise

We need to increase among eye practitioners awareness of the systemic medications that can exacerbate glaucoma

sustained steroid response requiring filtration surgery has become more common. Although there are few reports on the use of selective laser trabeculoplasty (SLT) for steroid response, this is a promising treatment.[4] The angle is open in steroid response. The exact mechanism of IOP elevation is not known but it is hypothesised to be an increased resistance to trabecular outflow from changes in the extracellular matrix.

Steroid response is influenced by dose and duration. People on high doses of topical or oral steroids, especially those in high-risk groups, need IOP monitoring. Apart from topical steroids, intravitreal, depot steroid receivers are being managed by ophthalmologists who monitor for side effects. Generally, since most patients optometrists manage are on topical steroids for less than six weeks, the risk of IOP changes is minimised, however these patients still require IOP monitoring. The subset that optometrists should be cognisant of are those on high doses of oral steroids. Eye care professionals should encourage GPs and other non-ophthalmic practitioners to refer these patients for IOP reviews.

Adrenergic agonists, anti-cholinergic agents, agents with anti-cholinergic effects

About one-third of acute angle closure—otherwise known as angle closure crisis—is initiated by a systemic medication.[5] Many are commonly used over-the-counter medications. Both adrenergic agonists and anti-cholinergic agents precipitate angle closure by dilating the pupil and lead to pupil block in susceptible eyes. Susceptible eyes are those with pre-existing untreated narrow angles and these are more common in the small, hypermetropic eye or a normal-sized eye with a crowded anterior segment.

Adrenergic agonists are commonly used both in the hospital setting for resuscitation and anaesthesia, and in the community in over-the-counter allergy and cold and 'flu formulations. Nebulised β2 agonists cause mydriasis and increase aqueous production and are often taken with ipatropium, an anti-cholinergic agent.

Anti-cholinergic agents, and more commonly those agents with some anti-cholinergic effect, are widely found, particularly in anti-depressants. The tri-cyclic and tetra-cyclic anti-depressants have an anti-cholinergic effect. The selective serotonin reuptake inhibitors (SSRI) have less anti-cholinergic effect but angle closure has been reported with many of the SSRI medication.[5] Anti-histamines (both H1 and H2) have been reported to cause angle closure. The classical sedating anti-histamines are the usual culprits; the newer generation of non-sedating anti-histamines are not. Anti-spasmodics are more likely to cause angle

Continued page 26

Case 2

A nine-year-old boy has bilateral anterior uveitis secondary to sarcoidosis, which is treated with systemic prednisolone, methotrexate and topical dexamethasone. He has uncontrolled IOP related to the dose of prednisolone and to the topical steroids. He requires acetozolamide (Diamox), timolol/brimonidine (Combigan) and latanoprost (Xalatan), and his IOPs fluctuate depending more on the steroid dose than any other variable. The IOPs reach the high 30s on treatment and the optic discs show progressive cupping in the left more than the right eye. While no normative data is available for this age group, the OCT shows a healthy pattern of RNFL (Figure 2).

How do you manage this?

The uveitic glaucoma is complicated by the steroid response and this is managed with sequential trabeculectomy with mitomycin. Following filtration surgery, he can use as much topical steroid as necessary. The oral presdnisolone tapers off and eventually ceases. He maintains an IOP of 10 to 13 mmHg in both eyes on no topical anti-glaucoma medications.

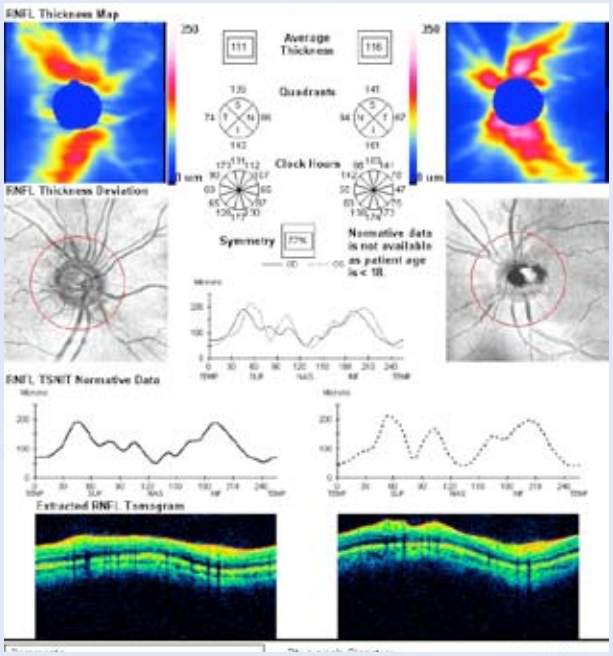


Figure 2. RNFL OCT (Cirrus) on nine-year-old boy: normal study with minor asymmetry

Systemic drugs can raise IOP

From page 25

closure than anti-reflux medications.

These medications carry a warning about glaucoma. Patients will ask about their risk. The key here is the gonioscopy findings: if the angle is open, they are not in the 'at risk' subgroup. Equally, if the angle closure has been treated with laser peripheral iridotomy (LPI), it should be safe for them to use these medications. However, in these complicated cases it may be prudent to communicate and check with a glaucoma ophthalmologist.

Paradoxically, cholinergic agents can also exacerbate angle closure in susceptible eyes that have not had LPI. This is by an anterior movement of the iris-lens diaphragm causing the angle to close.

Sulfur-containing compounds

Sulfur-containing compounds such as acetozolamide, hydrochlorthiazide and topiramate can cause angle closure by a non-pupil block, posterior pushing mechanism.[6] The reactions are idiosyncratic and bilateral. Ciliary body swelling is a common finding as well as cilio-choroidal effusions. There is anterior chamber shallowing. LPI will not be effective in this situation. The causative medication must be ceased and the glaucoma treated medically until resolution occurs from the withdrawal of the drug. Topiramate has been reported and is now well documented. With the advent of combination anti-hypertensives containing hydrochlorthiazide, this is the group we will particularly have to watch for in the future.

Other agents

Blood from posterior segment haemorrhage with anti-coagulants, fluid from angioedema from angiotensin converting enzyme (ACE) inhibitors or volume from intravitreal injections are other possible causes of angle closure (Case 3).

Conclusion

We need to increase general awareness among eye practitioners of the systemic medications that can exacerbate glaucoma. This will aid in identifying the 'at risk' groups so that we can target our message to them about the interaction between systemic medications and glaucoma.

References

1. Tripathi RC, Tripathi BJ, Haggerty C. Drug-induced glaucomas: mechanism and management. *Drug Saf* 2003; 26: 749-767.
2. Carnahan MC, Goldstein DA. Ocular complications of topical, peri-ocular, and systemic corticosteroids. *Curr Opin Ophthalmol* 2000; 11: 478-483.
3. Armaly MF. Statistical attributes of the steroid hypertensive response in the clinically normal eye. I. The demonstration of three levels of response. *Invest Ophthalmol* 1965; 4: 187-197.
4. Rubin B, Taglienti A, Rothman RF et al. The effect of selective laser trabeculoplasty on intraocular pressure in patients with intravitreal steroid-induced elevated intraocular pressure. *J Glaucoma* 2008; 17: 287-292.
5. Lachkar Y, Bouassida W. Drug-induced acute angle closure glaucoma. *Curr Opin Ophthalmol* 2007; 18: 129-133.
6. Lee GC, Tam CP, Danesh-Meyer HV et al. Bilateral angle closure glaucoma induced by sulphonamide-derived medications. *Clin Exp Ophthalmol* 2007; 35: 55-58.

Case 3

A 71-year-old woman presents with reduced left vision and is found to have an occult choroidal new vessel on fluorescein angiography. Mildly elevated IOPs of 22 to 23 mmHg are present with narrow angles and there is a history of intermittent eye ache. Her medications included sertraline (Zoloft), a SSRI and salbutamol (Ventolin). She undergoes intravitreal ranibizumab (Lucentis) treatment and has a post-injection IOP of 62 mmHg requiring an anterior chamber tap. A smaller volume 0.03 ml injection is used for the second injection of Lucentis but she still develops an IOP of 60 mmHg post-injection. Visante OCT images confirm the iridotrabecular contact and pupil block (Figure 3).

How do you manage this?

She has eyes predisposed to angle closure. The left eye has experienced episodes of angle closure as a result of a posterior pushing mechanism from the intravitreal volume load. The history suggests possible angle closure symptoms; this could be exacerbated by her other medications as well. A laser peripheral iridotomy is performed. Following LPI, a third Lucentis injection is given. Immediately after this injection the IOP is 29 mmHg. She requires definitive treatment of the right eye as well. In the right eye, a cataract is present and removal of the cataract is recommended for the angle closure.

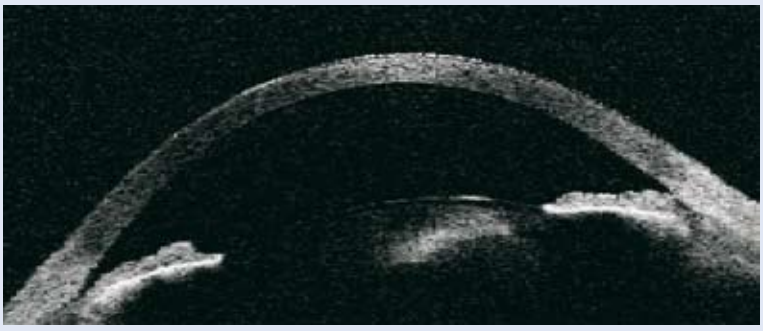


Figure 3. Anterior segment (Visante) OCT showing iridotrabecular contact on the right side

Case 4

A 40-year-old polysubstance abuser presents to hospital with loss of vision and complete synechial angle closure in the left eye with an IOP of 50 mmHg and narrow angles in the right eye with IOP of 18 mmHg. There is a family history of angle closure glaucoma.

How do you manage this?

The painful blind left eye is treated with cyclodiode laser and the right eye is treated with LPI first, and then iridoplasty for persistent iridotrabecular contact following LPI. This case illustrates the possibility of exacerbation of acute angle closure by non-prescription drugs.

Classes of drugs	Action	Generic name (trade name)	Clinical use	Mechanism of IOP elevation
Corticosteroids	Glucocorticoid (topical, oral, local, intravitreal)	**Oral**: prednisone (Panafcort), prednisolone (Panafcortelone), cortisone (Cordate) **Intravenous**: methylprednisolone (Depo-Medrol), triamcinolone (Kenacort) **Both**: dexamethasone (Dexamethasone), betamethasone (Celestone), hydrocortisone (Hysone, Solu-Cortef)	Inflammation, autoimmune diseases, immune suppression	Open angle, reduced trabecular outflow
Adrenergic agonists	Catecholamine (CCA), non-selective adrenergic agonist	adrenaline	Arrhythmia, resuscitation, anaesthesia	Pupil block angle closure (PB-AC)
	α1 adrenergic agonist	phenylephrine (Codral, Lemsip, Sudafed, Demazin, Nyal decongestant, Prenedfrin forte), apraclonidine (Iopidine, mostly α2)	Mydriatic decongestant	PB-AC
	β2 agonist, fast acting	salbutamol (Ventolin), terbutaline (Bricanyl)	Asthma	PB-AC, increases aqueous production
	Non-CCA adrenergic agonists	ephedrine	Vasopressor	PB-AC
	Non-CCA adrenergic agonists	pseudoephedrine (many cold and 'flu formulations including Benadryl, Bisolvon, Codral, Dimetapp, Demazin c, antihistamine combinations)	Decongestant	PB-AC
	Non-CCA adrenergic agonists	amphetamine, cocaine	Illicit drug	PB-AC
	Non-CCA adrenergic agonists	imipramine, monoamine oxidase inhibitors	Depression	PB-AC
	Dopamine agonist (non-selective adrenergic agonist)	ibopamine (not available in Australia)	Mydriatic	Increases aqueous production
Cholinergic agents	Muscarinic agonist	pilocarpine, acetylcholine, carbachol	Glaucoma, intra-operative miosis	PB-AC
Anti-cholinergic agents	Anti-muscarinic	atropine	Bradycardia, gastrointestinal spasm	PB-AC
	Anti-muscarinic	hyoscine (Buscopan)	Gastrointestinal, biliary, renal spasm	PB-AC
	Anti-muscarinic	propantheline (Pro-Banthine)	Gastrointestinal and bladder spasm, excessive sweating	PB-AC
	Anti-muscarinic	ipatropium (Atrovent)	Asthma	PB-AC
	Anti-muscarinic	datura plant	Accidental poisoning, hallucinogen	PB-AC
Agents with anti-cholinergic effects	Tricyclic anti-depressant	amitriptyline (Endep), imipramine (Tofranil, Tolerade)	Depression	PB-AC
	Tetracyclic anti-depressant	mianserin (Lumin, Tolvon), mirtazapine (APO-Mirtazapine, Avanza, Axit, Remeron)	Depression	PB-AC
	Selective serotonin reuptake inhibitor (SSRI)	fluoxetine (Prozac, Zactin), paroxetine (Aropax, Extine, Paxtine), citalopram (Talam, Talohexal, Celopram, Celica, Ciazil, Cipramil, Citalobell)	Depression	PB-AC
	Phenothiazine	fluphenazine (Modecate), chlorpromazine (Largactil)	Psychosis	PB-AC
	Anti-histamine (1st generation, non-selective H1 antagonist, sedating)	chlorpheniramine (Demazin, Codral Night, Lemsip, Panadol Allergy Sinus), dexchlorpheniramine (Polaramine) diphenhydramine (Benadryl, Snuzaid), doxylamine (Dimatapp, Mersyndol, Dolased)	Allergy, sedative	PB-AC
		promethazine (Phenergan)		
		triprolidine		
	H2 antagonist	cimetidine (Tagamet), ranitidine (Zantac)	Anti-ulcer, reflux	PB-AC
Sulfur containing compounds	Sulfur substituted monosaccharide	topiramate (Topamax)	Epilepsy, migraine prevention	Ciliary body swelling -angle closure (CB-AC)
	Carbonic anhydrase inhibitor	acetozolamide (Diamox)	Glaucoma	CB-AC
	Thiazide diuretic	hydrochlorthiazide (Atacand Plus, Co-Diovan, Enalapril/HCT, Fosetic 20/12.5), fosinopril/HCT, Hyforil, Karvezide, Micardis Plus, Monoplus, Olmetec Plus, Renitec Plus 20/6, Tevetin Plus)	Hypertension	CB-AC
Other	Anti-coagulant	warfarin (Coumadin)	Anti-coagulation	Posterior-pushing angle closure (PP-AC) from haemorrhage
	ACE inhibitor	candesartan cilexetil (Atacand)	Hypertension	PP-AC from posterior segment angio-oedema

Substances that elevate intraocular pressure

New S4 drugs on list in Victoria

Cephazolin, Azithromycin and Cyclosporine available only through a compounding pharmacy service

The antibiotic drugs Cephazolin and Azithromycin, and the anti-inflammatory Cyclosporine have been added to the list of Schedule 4 poisons for use by therapeutically endorsed optometrists in Victoria.

These drugs, approved for use by the Optometrists Registration Board of Victoria (ORBV) in June this year, are not available in Australia as commercial preparations but may be obtained through a compounding pharmacy service such as the Royal Melbourne Eye and Ear Hospital.

'Any therapeutically endorsed optometrist registered in Victoria can prescribe these antibiotic drugs if required,' says Sally Doyle, who was the chairwoman of the Schedule 4 poisons subcommittee until 30 June. 'What is most important is that the optometrist provides the appropriate drug to the patient. The more drugs we have access to, the less likelihood there will be of having to resort to a second-best option.'

'The inclusion of these drugs on the list is forward planning,' says The University of Melbourne academic Alex Gentle. 'Drugs such as Cyclosporine and Azithromycin are commercially available in the USA and could be introduced to the Australian market if drug companies see this as viable.'

In the future, it may become more common for therapeutically endorsed optometrists to work with ophthalmology, particularly in hospital settings. Where the drugs are available at a compounding pharmacy, optometrists will no longer be disadvantaged if they are required to write a prescription for these agents.

'The impact for optometrists at present will be minimal unless they are working in a primary care hospital setting where they can get these drugs compounded,' says Gentle.

'Alternatively, at some stage in the future, it may be possible for optometrists to gain access to drugs not commercially available in Australia but avaliable overseas under the Special Access Scheme if the patient's circumstances and condition require the need, although this would rarely occur.'

Another key amendment to the Schedule 4 poisons listing is the removal of certain antihistamine and mast cell stabilising drugs, which are now listed as Schedule 2 or 3 drugs and are available over the counter.

'The new listing permits optometrists, regardless of whether they are therapeutically endorsed, to use or prescribe Schedule 2 or 3 poisons in the form of a preparation for topical use in the eye within the meaning of the *Drugs Poisons and Controlled Substances Act*,' says Doyle.

Although patients now have access to these drugs over the counter, Doyle stresses that patients should still continue to have regular examinations so their conditions can be monitored adequately.

The ORBV decision affects only the prescribing rights of optometrists practising in Victoria but, according to Gentle, potentially it could have a wider impact when national registration comes into effect.

Avastin trial shows promising results

Intravitreal bevacizumab (Avastin) may be beneficial in the treatment of neovascular glaucoma (NVG) when used in conjunction with other therapies.

Avastin was injected into the eyes of 52 patients with NVG as part of a clinical trial.[1] Sixty per cent of these patients received a glaucoma drainage implant.

Six months after treatment, median visual acuity had improved and mean intraocular pressure had decreased significantly.

Avastin is a cancer drug that has proved successful as an off-label treatment for wet macular degeneration and diabetic retinopathy.

1. Moraczewski A, Lee R, Palmberg P et al. Outcomes of treatment of neovascular glaucoma with intravitreal bevacizumab. *Brit J Ophthalmol* 2009; 93: 589-593.

Optive 10 ml discontinued

The 10 ml form of Optive lubricant eye-drops has been discontinued and optometrists are encouraged to update their system to the PBS-listed 15 ml dose.

Optive is manufactured by Allergan Australia. The 15 ml form was launched in February 2008 and has been listed on the PBS since 1 December.

Optometrists who have ordered the 10 ml size will be issued the 15 ml form. The drops can be used up to six months after being opened.

Uveitis and systemic causes

Two case reports involving uveitis patients have highlighted the broad nature of the disease and the exhaustive process often involved in determining its aetiology.

Two patients—an 86-year-old white man and 46-year-old black man—were diagnosed with chronic, bilateral, anterior uveitis.

Both underwent extensive systemic testing to determine if there was an underlying cause of their condition. The former patient's uveitis appeared to be idiopathic with no systemic cause, while the latter's was attributed to systemic sarcoidosis.

Authors of the reports[1] said that such forms of uveitis required a diagnostic panel of tests to determine any links with a systemic condition, and that optometrists needed to have a thorough understanding of the possible aetiologies of this condition to best care for patients. In Australia optometrists typically do this by comanagement with the patient's GP or by referral to another physician.

A complicating factor is that several systemic conditions can manifest as uveitis. Sarcoidosis is associated with the condition in 3.6 to 7.0 per cent of uveitis cases with a systemic link.

Sarcoidosis has multiple ocular manifestations, including conjunctivitis, nodules, keratoconjunctivitis, retinal detachment and haemorrhaging, cotton wool spots, cataracts and glaucoma.

Diagnosing sarcoidosis is challenging; the authors said that there was no single test to definitively diagnose the condition and practitioners had to use a process of elimination.

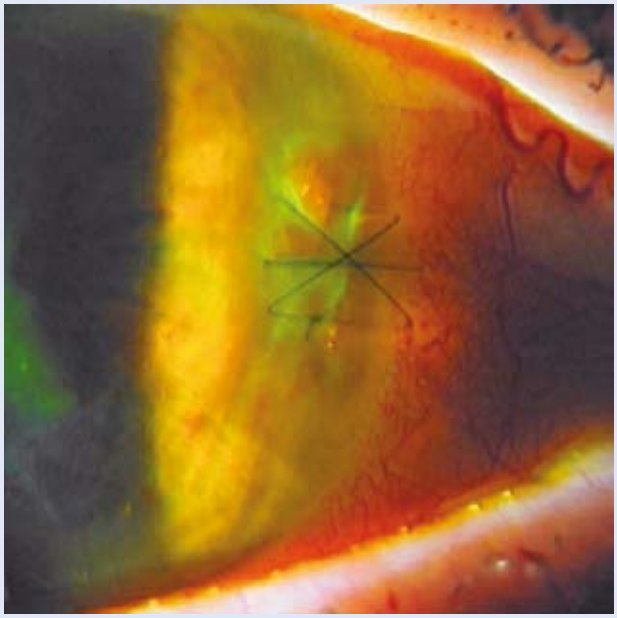
1. Hanno E, Gay D, Boyer S. Two differing presentations of chronic bilateral anterior uveitis. *Optometry* 2009; 80: 70-75.

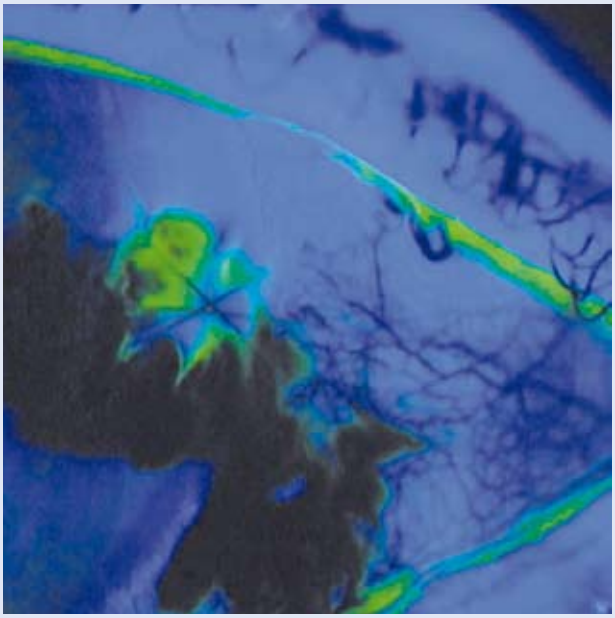
photo clinic

Graham Lakkis
BOptom GradCertOcTherap

Post-op wound leak

Wound leak following cataract surgery. Day 1 post-operative findings were: positive Siedel test, IOP 4 mmHg. Management included tamponading the cornea with a tight, soft contact lens, and prophylactic topical antibiotics. The wound was resutured by the surgeon the following day.





Ocular allergy symptoms cause patients to stop contact lens wear

Contact lens wear drops dramatically in patients experiencing symptoms of ocular allergy, a survey by the Asthma and Allergy Foundation of America has revealed.

When experiencing symptoms, 50 per cent of contact lens-wearing survey respondents admitted switching to spectacles and a further 45 per cent said they wore their lenses less often. Two-thirds of these respondents said wearing contact lenses caused them significant discomfort when suffering ocular allergy symptoms.

More than 800 people responded to the online survey, one-third of whom identified themselves as contact lens wearers.

Twelve per cent of respondents said they had ceased wearing contact lenses because of ocular allergies.

Despite symptoms associated with Spring, 51 per cent of survey respondents reported experiencing symptoms year-round and 26 per cent identified Autumn as the season in which they experienced the worst symptoms.

Many respondents said their symptoms caused them frustration, fatigue and distraction. Forty per cent of female respondents felt red, puffy eyes made them look tried and unattractive.

Bepreve new allergy drug

A US Food and Drug Administration advisory committee has recommended the approval of Bepreve eye-drops to treat ocular itching associated with allergic conjunctivitis.

Bepreve is the commercial name for bepotastine besilate and is manufactured by ISTA Pharmaceuticals.

ISTA says that the drug is a highly-selective antagonist of the histamine (H1) receptor, stabilising mast cells and preventing eosinophils from entering inflamed ocular tissue.

PBS list of medicines for optometrists 4 August 2009

	Product	Max qty	Repeats
Antiglaucoma preparations			
Betaxolol eye-drops, suspension, 2.5 mg (as hydrochloride)/mL, 5 mL	Betoptic S	1	5
Betaxolol eye-drops, solution, 5 mg (as hydrochloride)/mL, 5 mL	Betoptic		
	BetoQuin	1	5
Bimatoprost eye-drops 300 mg/mL, 3 mL	Lumigan	1	5
Bimatoprost with timolol eye-drops containing 300 mg bimatoprost with timolol 5 mg (as maleate)/mL, 3 mL	Ganfort 0.3/5	1	5
Brimonidine eye-drops containing brimonidine tartrate 2 mg/mL, 5 mL	Alphagan		
	Enidin	1	5
Brimonidine with timolol eye-drops containing brimonidine tartrate 2 mg with timolol 5 mg (as maleate)/mL, 5 mL	Combigan	1	5
Brinzolamide eye-drops 10 mg/mL, 5 mL	Azopt		
	BrinzoQuin	1	5
Dorzolamide eye-drops 20 mg (as hydrochloride)/mL, 5 mL	Trusopt	1	5
Dorzolamide with timolol eye-drops containing dorzolamide 20 mg (as hydrochloride) with timolol 5 mg (as maleate)/mL, 5 mL	Cosopt	1	5
Latanoprost eye-drops 50 micrograms/mL, 2.5 mL	Xalatan	1	5
Latanoprost with timolol eye-drops 50 micrograms latanoprost with timolol 5 mg (as maleate)/mL, 2.5 mL	Xalacom	1	5
Pilocarpine eye-drops containing pilocarpine hydrochloride 10 mg/mL, 15 mL	Isopto Carpine		
	Pilopt	1	5
	PV Carpine		
Pilocarpine eye-drops containing pilocarpine hydrochloride 20 mg/mL, 15 mL	Isopto Carpine		
	Pilopt	1	5
	PV Carpine		
Pilocarpine eye-drops containing pilocarpine hydrochloride 40 mg/mL, 15 mL	Isopto Carpine		
	Pilopt	1	5
	PV Carpine		
Pilocarpine eye-drops containing pilocarpine hydrochloride 60 mg/mL, 15 mL	Pilopt	1	5
	PV Carpine		
Timolol eye-drops 2.5 mg (as maleate)/mL, 5 mL	Tenopt		
	Timoptol	1	5
Timolol eye-drops 5 mg (as maleate)/mL, 5 mL	Tenopt		
	Timoptol	1	5
Timolol eye-drops (gellan gum solution) 2.5 mg (as maleate)/mL, 2.5 mL	Timoptol XE	1	5
Timolol eye-drops (gellan gum solution) 5 mg (as maleate)/mL, 2.5 mL	Timoptol XE	1	5
Timolol eye gel 1 mg (as maleate)/g, 5 g	Nyogel	1	5
Travoprost eye-drops 40 micrograms/mL, 2.5 mL	Travatan	1	5
Travoprost with timolol eye-drops 40 micrograms travoprost with timolol 5 mg (as maleate)/mL, 2.5 mL	Duotrav	1	5

By writing a PBS prescription for an antiglaucoma agent, the prescriber is certifying that the criteria set out in the PBS guidelines are satisfied

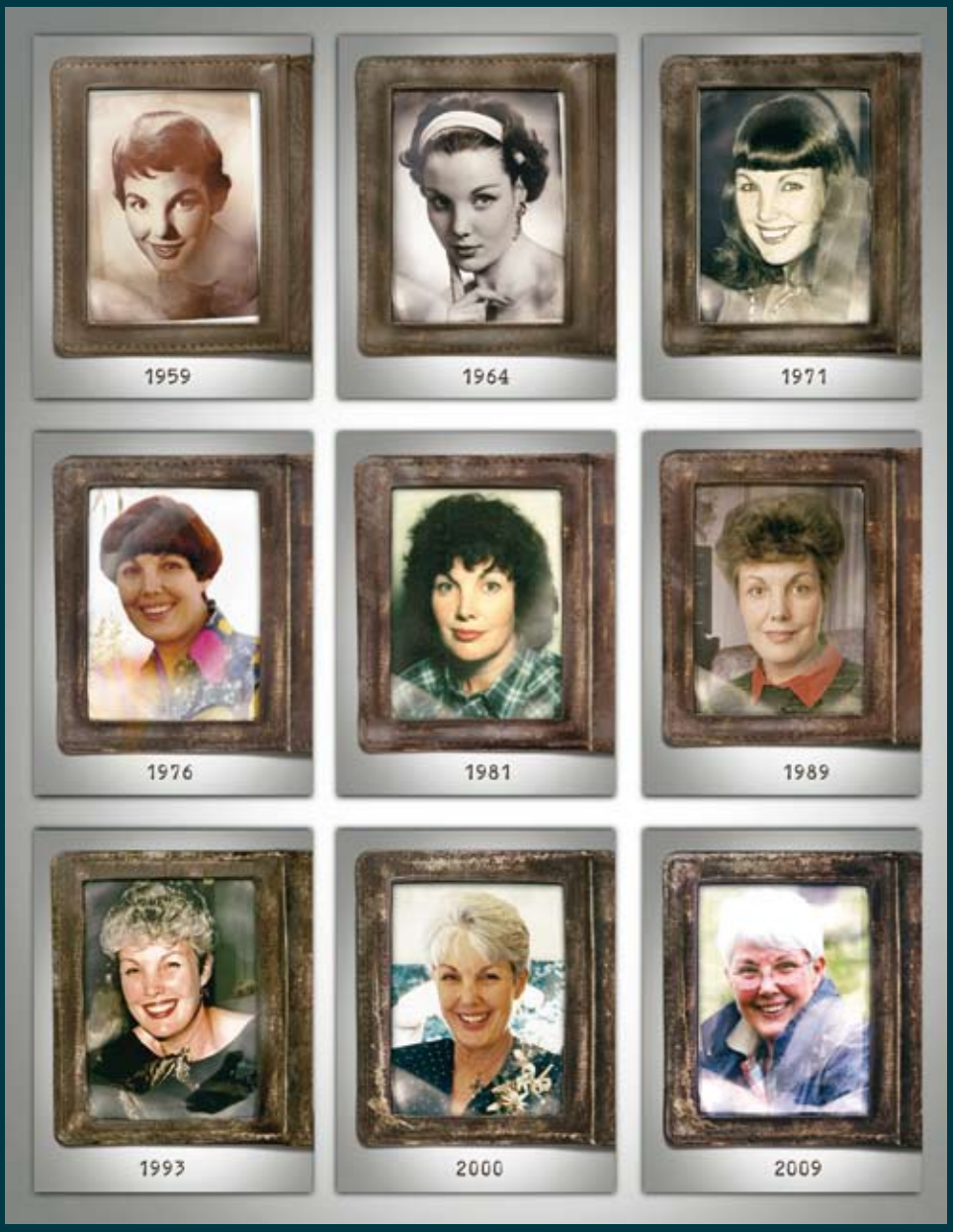
	Product	Restriction	Max qty	Repeats
Antibiotics		Unrestricted		
Chloramphenicol eye-drops 5 mg/mL (0.5%), 10 mL	Chlorsig		1	2
	Chloromycetin		1	2
Chloramphenicol eye ointment 10 mg/g (1%), 4 g	Chlorsig		1	0
	Chloromycetin		1	0
Framycetin sulfate eye-drops 5 mg/mL (0.5%), 8 mL	Sofracycin		1	2
Sulfacetamide sodium eye-drops 100 mg per mL (10%), 15 mL	Bleph-10		1	2
Anti-inflammatory agents		Unrestricted		
Fluorometholone eye-drops 1mg/mL (0.1%), 5mL	Flucon		1	0
	FML Liquifilm		1	0
Fluorometholone acetate eye-drops 1 mg/mL (0.1%), 5 mL	Flarex		1	0
Flurbiprofen sodium eye-drops 300 µg/mL (0.03%) single dose units 0.4 mL, 5	Ocufen		1	0
Hydrocortisone acetate eye ointment 10 mg/g (1%), 5 g	Hycor		1	0
Anti-allergy agents		Restricted:		
Sodium cromoglycate eye-drops 20 mg/mL (2%), 10 mL	Cromolux	Vernal keratoconjunctivitis	1	5
	Opticrom		1	5

Product	Restriction	Max	Repeats	qty
Tear supplements		Restricted:		
Carbomer 980 ocular lubricating gel 2 mg/g (0.2%), 10 g	Geltears	Severe dry eye inc Sjögren's synd	1	5
	PAA		1	5
	Viscotears Liquid Gel		1	5
Carmellose sodium with glycerin eye-drops 5 mg-9 mg per mL (0.5%-0.9%), 15 mL	Optive		1	3
Carmellose sodium eye-drops 10 mg/mL (1%), 15 mL	Refresh Liquigel		1	5
Carmellose sodium eye-drops 5 mg/mL (0.5%), 15 ml	Refresh Tears plus		1	5
Hypromellose eye-drops 3 mg/mL (0.3%), 15 mL (contains sodium perborate)	In a Wink Moist'ing		1	5
	Genteal		1	5
Hypromellose eye-drops 5 mg/mL (0.5%), 15 mL	Isopto Tears		1	5
	Methopt		1	5
Hypromellose with carbomer 980 ocular lubricating gel 3 mg-2 mg/g (0.3-0.2%), 10 g	HPMC PAA		1	5
	Genteal gel		1	5
Hypromellose with dextran eye-drops 3 mg-1 mg/mL (0.3%-0.1%), 15 mL	Poly-Tears		1	5
	Tears Naturale		1	5
Polyethylene glycol 400 with propylene glycol drops 4 mg-3 mg/mL (0.4-0.3%); 15 mL	Systane		1	5
Polyvinyl alcohol eye-drops 14 mg/mL (1.4%), 15 mL	PVA Tears		1	5
Polyvinyl alcohol eye-drops 30 mg/mL (3%), 15 mL	PVA Forte		1	5
Polyvinyl alcohol eye-drops 14 mg/mL (1.4%), 15 mL	Liquifilm Tears		1	5
Polyvinyl alcohol eye-drops 30 mg/mL (3%), 15 mL	Liquifilm Forte		1	5
Polyvinyl alcohol eye-drops 14 mg/mL (1.4%), 15 mL (contains sodium chorite/hydrogen peroxide as preservative)	Vistil		1	5
Polyvinyl alcohol eye-drops 30 mg/mL (3%), 15 mL (contains sodium chorite/hydrogen peroxide as preservative)	Vistil Forte		1	5
Unpreserved tear supplements		Authority required:		
Carbomer 974 ocular lubricating gel 3 mg/g (0.3%), single dose units 0.5 g, 30	Poly Gel	Severe dry eye syndrome in patients sensitive to preservatives in multi-dose eye-drops	3	5
Carbomer 980 eye-drops 2 mg per (0.2%) , single dose units 0.6 mL, 30	Viscotears		3	5
Carmellose sodium eye-drops 5 mg/mL (0.5%), single dose units 0.4 mL, 30	Cellufresh		3	5
Carmellose sodium eye-drops 10 mg/mL (1%) , single dose unit 0.4 mL, 30	Celluvisc		3	5
Carmellose sodium eye-drops 2.5 mg/mL (0.25%), single dose units, 0.6 mL, 24	TheraTears		4	5
Carmellose sodium ocular lubricating gel 10 mg/mL (1%), single dose 0.6 mL, 28	TheraTears		3	5
Hypromellose with dextran eye-drops 3-1 mg/mL (0.3-0.1%), single 0.4 mL, 28	Bion Tears		3	5
Tamarindus indica seed polysaccharide eye-drops 10 mg/mL, 0.5 mL, 20	Visine Professional		3	5
Polyethylene glycol 400 with propylene glycol drops 4 mg-3 mg/mL (0.4-0.3%); single dose units 0.8 mL, 28	Systane		2	5
Soy lecithin eye spray 10 mg/mL (1%), 10 mL	Tears Again		2	5
Topical ocular lubricant ointments		Unrestricted		
Paraffin compound eye ointment 3.5 g	Polyvisc		2	5
	Duratears		2	5
Paraffin pack containing 2 tubes compound eye ointment 3.5 g	Polyvisc (2 pack)		1	5
Paraffin pack containing 2 tubes compound eye ointment 3.5 g	Ircal (2 pack)		1	5
	Lacri-Lube (2 pack)		1	5

Commercially available controlled substances that may be used or prescribed by optometrists

Ocular Medicine	Vic	Tas	Qld	NSW & ACT	NT	SA	WA*	PBS Optometry	PBS Listed
Anti-infectives									
Chloramphenicol	✓	✓	✓	✓	✓	✓	–	✓	✓
Ciprofloxacin	✓	✓	✓	–	✓	✓	–	–	✓
Framycetin	✓	✓	✓	✓	✓	✓	–	✓	✓
Gentamicin sulfate	✓	✓	✓	–	✓	✓	–	–	✓
Ofloxacin	✓	✓	✓	–	✓	✓	–	–	✓
Sulfacetamide	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tetracycline	✓	✓	✓	✓	✓	✓	–	N/L	N/L
Tobramycin	✓	✓	✓	–	✓	✓	–	–	✓
Aciclovir	✓	✓	✓	–	✓	✓	–	✓	✓
Anti-inflammatories									
Dexamethasone	✓	✓	◆	–	✓	✓	–	–	✓
Fluorometholone	✓	✓	✓	✓	✓	✓	–	✓	✓
Fluorometholone acetate	✓	✓	✓	✓	✓	✓	–	✓	✓
Hydrocortisone	✓	✓	✓	✓	✓	✓	–	✓	✓
Prednisolone	✓	✓	◆	–	✓	✓	–	–	✓
Diclofenac	✓	✓	✓	✓	✓	✓	–	N/L	N/L
Flurbiprofen	✓	✓	✓	✓	✓	✓	–	✓	✓
Ketorolac	✓	✓	✓	✓	✓	✓	–	N/L	N/L
Decongestants, anti-allergics and astringents									
Antazoline	✓	✓	✓	✓	✓	✓	✓	N/L	N/L
Ketotifen	✓	✓	✓	✓	✓	✓	✓	N/L	N/L
Levocabastine	✓	✓	✓	✓	✓	✓	✓	N/L	N/L
Lodoxamide	✓	✓	✓	✓	✓	✓	✓	N/L	N/L
Naphazoline	✓	✓	✓	✓	✓	✓	✓	N/L	N/L
Olopatadine	✓	✓	✓	✓	✓	✓	–	N/L	N/L
Pheniramine	✓	✓	✓	✓	✓	✓	✓	N/L	N/L
Sodium cromoglycate	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tetrahydrozoline	✓	✓	✓	✓	✓	✓	✓	N/L	N/L
Anti-glaucoma preparations									
Apraclonidine	✓	✓	◆	✓	✓	✓	–	–	✓
Betaxolol	✓	✓	◆	✓	✓	✓	–	✓	✓
Bimatoprost	✓	✓	◆	✓	✓	✓	–	✓	✓
Brimonidine	✓	✓	◆	✓	✓	✓	–	✓	✓
Brinzolamide	✓	✓	◆	✓	✓	✓	–	✓	✓
Dorzolamide	✓	✓	◆	✓	✓	✓	–	✓	✓
Latanoprost	✓	✓	◆	✓	✓	✓	–	✓	✓
Pilocarpine	✓	✓	◆	✓	✓	✓	–	✓	✓
Timolol	✓	✓	◆	✓	✓	✓	–	✓	✓
Travoprost	✓	✓	◆	✓	✓	✓	–	✓	✓
Timolol+Bimatoprost	✓	✓	◆	✓	✓	✓	–	✓	✓
Timolol+Brimonidine	✓	✓	◆	✓	✓	✓	–	✓	✓
Timolol+Dorzolamide	✓	✓	◆	✓	✓	✓	–	✓	✓
Timolol+Latanoprost	✓	✓	◆	✓	✓	✓	–	✓	✓
Timolol+Travoprost	✓	✓	◆	✓	✓	✓	–	✓	✓
Mydriatics and cycloplegics									
Atropine	✓	✓	✓	✓	✓	✓	–	–	✓
Cyclopentolate	✓	D	✓	✓	✓	✓	D	N/L	N/L
Homatropine	✓	D	✓	✓	✓	✓	–	–	✓
Pilocarpine	✓	✓	✓	–	✓	✓	–	–	✓
Phenylephrine	✓	✓	✓	✓	✓	✓	–	N/L	N/L
Tropicamide	✓	D	✓	✓	✓	✓	D	N/L	N/L
Local anaesthetics									
Amethocaine	✓	D	✓	✓	✓	✓	–	N/L	N/L
Lignocaine	✓	D	–	–	✓	✓	–	N/L	N/L
Oxybuprocaine	✓	D	✓	✓	✓	✓	D	N/L	N/L
Proxymetacaine	✓	D	✓	✓	✓	✓	D	N/L	N/L

◆ The use of these medicines by optometrists is currently being considered
* Optometrists in Western Australia do not have access to the PBS
D Diagnostic use only
N/L Substance is not listed under the PBS



THERE ARE SOME THINGS YOUR EYES NEVER GROW TIRED OF

Help your patients continue to see what's precious to them.

Xalatan, providing sustained IOP* reduction and proven tolerability for up to 5 years.[1^,2,3]

Xalatan® latanoprost

PBS Information: This drug is listed on the PBS for the treatment of Open Angle Glaucoma and Ocular Hypertension.

*Low IOP is associated with reduced progression of visual field defect in patients with glaucoma.[4,5] ^Xalatan used as adjunctive therapy.[1]

REFER TO PRODUCT INFORMATION BEFORE PRESCRIBING. MINIMUM PRODUCT INFORMATION: XALATAN® (Latanoprost 50 micrograms/mL) Eye Drops. **Indications:** Reduction of intraocular pressure (IOP) in patients with open-angle glaucoma or ocular hypertension. **Dosage and administration:** One eye drop in the affected eye(s) once daily. Other eye drops at least 5 minutes apart. **Contraindications:** Hypersensitivity to ingredients. **Precautions:** Change in eye colour due to increased iris pigmentation, heterochromia; eyelid skin darkening; changes in eyelashes and vellus hair; macular oedema; other types of glaucoma; pseudophakia; aphakia; contact lenses. Severe or brittle asthma. Pregnancy category B3, lactation. Children. Interactions: other prostaglandins, thiomersal. Blurring of vision. **Adverse effects:** Increased iris pigmentation; eye irritation (burning, grittiness, itching, stinging and foreign body sensation); eyelash and vellus hair changes (darkening, thickening, lengthening, increased number); mild to moderate conjunctival hyperaemia; transient punctate epithelial erosions; blepharitis; eye pain; conjunctivitis; vision blurred; eyelid oedema, macular oedema. Muscle/joint pain; dizziness; headache; localised skin reaction on the eyelids; skin rash. Uncommonly: keratitis; non-specific chest pain; Others, see full PI. PBS dispensed price $41.71. The full disclosure Product Information is available on request from Pfizer Australia Pty Limited. ABN 50 008 442 348. 38-42 Wharf Road, West Ryde NSW 2114. Full PI approved by the TGA on 4 February 2003, last amended 20 November 2006. Pfizer Medical Information 1800 675 229.

References: 1. Alm A *et al. Arch Ophthalmol* 2004; 112: 957–965. **2.** Goldberg I *et al. Eur J Ophthalmol* 2008; 18(3): 408–416. **3.** Hedman K *et al. Surv Ophthalmol* 2002; 47(Suppl 1): S65-S76 **4.** The AGIS investigators. *Am J Ophthalmol* 2000; 130: 429-440. **5.** Goldberg I. *Surv Ophthalmol* 2003; 48(Suppl 1): S3-S7. 04/09 McCann Healthcare XALAT0065/OP/W

Pfizer AUSTRALIA

Pfizer Ophthalmics

FORESIGHT

[the ability to see into the future and be alert to the signs ahead]

Never has it been more vital to test for age-related macular degeneration (AMD).

AMD is now the leading cause of blindness in Australia.[1,6] Lucentis offers real hope to those diagnosed with wet AMD.[2,3,5]

Already helping thousands maintain independent lives, Lucentis is proven to help patients gain and sustain vision.[2,3,4] Some patients treated report improvement as early as 7 days after treatment.[2]

Because early detection and treatment of AMD can significantly improve future outcomes,[1,2,3] *your referral today could save your patient's sight tomorrow.*

LUCENTIS®
RANIBIZUMAB
Improving vision. Restoring hope.[2,3,5]

PBS Dispensed Price: $1975.93. Please refer to the Product Information before prescribing. Product Information is available from Novartis Pharmaceuticals Australia Pty Limited or visit www.novartis.com.au. For further information please contact Medical Information & Communication on 1800 671 203. **Indication:** Treatment of neovascular (wet) age-related macular degeneration (AMD). 0.5 mg or 0.3 mg is recommended to be administered by intravitreal injection once a month. **Dosage and administration:** Recommended dose is 0.5 mg (0.05 mL) or 0.3 mg (0.03 mL) given monthly. Interval between doses should not be shorter than 1 month. Treatment might be reduced to one injection every 3 months after the first three injections but, compared to continued monthly doses, dosing every 3 months may lead to an approximate 5-letter (1-line) loss of visual acuity benefit, on average, over the following 9 months. Patients should be evaluated regularly. Must be administered by a qualified ophthalmologist using aseptic techniques. Broad-spectrum topical microbicide and anaesthetic should be administered prior to injection. Patient should self-administer antimicrobial drops four times daily for 3 days before and after each injection. Not recommended in children and adolescents. **Contraindications:** Hypersensitivity to product components, active or suspected ocular or periocular infections, active intraocular inflammation. **Precautions:** Intravitreal injections have been associated with endophthalmitis, intraocular inflammation, rhegmatogenous retinal detachment, retinal tear and iatrogenic traumatic cataract. Proper aseptic injection techniques must be used. Monitor patients during the week following injection to permit early treatment if an infection occurs. Intraocular pressure and perfusion of the optic nerve head must be monitored and managed appropriately. Safety and efficacy of administration to both eyes concurrently have not been studied. There is a *potential* risk of arterial thromboembolic events following intravitreal use of VEGF inhibitors. *A numerically higher stroke rate was observed in patients treated with ranibizumab 0.5mg compared to ranibizumab 0.3mg or control, however, the differences were not statistically significant. Patients with known risk factors for stroke, including history of prior stroke or transient ischaemic attack, should be carefully evaluated by their physicians as to whether Lucentis treatment is appropriate and the benefit outweighs the potential risk.* As with all therapeutic proteins, there is a potential for immunogenicity with Lucentis. No formal interaction studies have been performed. Should not be used during pregnancy unless clearly needed; use of effective contraception recommended for women of childbearing potential; breastfeeding not recommended. Patients who experience temporary visual disturbances following treatment must not drive or use machines until these subside. **Side effects:** Very common: Conjunctival haemorrhage, eye pain, vitreous floaters, retinal haemorrhage, *intraocular pressure increased,* vitreous detachment, intraocular inflammation, eye irritation, cataract, foreign body sensation in eyes, lacrimation increased, visual disturbance, blepharitis, subretinal fibrosis, ocular hyperaemia, visual acuity blurred/decreased, dry eye, vitritis, eye pruritis, *nasopharyngitis,* headache, *arthralgia.* Common: Ocular discomfort, eyelid oedema, *eyelid pain,* conjunctival hyperaemia, posterior capsule opacification, punctate keratitis, corneal abrasion, anterior chamber flare, *injection site haemorrhage,* eye haemorrhage, retinal exudates, injection site reactions, conjunctivitis, *conjunctivitis allergic, eye discharge, photopsia,* photophobia, maculopathy, detachment of the retinal pigment epithelium retinal degeneration, retinal disorder, retinal detachment, retinal tear, *retinal pigment epithelium tear,* vitreous haemorrhage, vitreous disorder, uveitis, iritis, iridocyclitis, *cataract subcapsular, influenza, anaemia, anxiety, stroke, cough, nausea, allergic reactions (rash, urticaria, pruritis, erythema).* Uncommon: Keratopathy, *iris adhesions, corneal deposits,* dellen, corneal striae, *injection site pain, injection site irritation, abnormal sensation in eye, hyphema,* cataract nuclear, angle closure glaucoma, endophthalmitis, eyelid irritation, blindness, corneal oedema, hypopyon. Rare but serious adverse reactions related to intravitreal injections include endophthalmitis, rhegmatogenous retinal detachment, retinal tear and iatrogenic traumatic cataract. **Please note changes to Product Information in italics.* **1.** Bressler NM. J Am Board Fam Pract 2002;15:142-152. **2.** Rosenfeld PJ, et al. N Engl J Med. 2006;355:1419-1431. **3.** Brown DM, et al. N Engl J Med. 2006;355:1432-1444. **4.** LUCENTIS Approved Product Information. **5.** Chang TS, et al. Arch Ophthalmol. 2007;125:1460-1469. **6.** Attebo K, et al. Ophthalmol. 1996, 103: 357-364. Novartis Pharmaceuticals Australia Pty Limited, ABN 18 004 244 160. 54 Waterloo Road, North Ryde NSW 2113. ® Novartis Pharmaceuticals Australia Pty Limited. NVO_LUC65_11/2008. Bluedesk LUC3C.

NOVARTIS

PBS Information: Authority required. Refer to PBS schedule for full Authority Required Information.